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THE GENUS *STEATONYSSUS* KOLENATI (ACARI: MESOSTIGMATA)

BY

W. M. TILL & G. OWEN EVANS
British Museum (Natural History)

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THE GENUS *STEATONYSSUS* KOLENATI (ACARI: MESOSTIGMATA)*

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SYNOPSIS

The external morphology and classification of the macronyssine genus *Steatonyssus* Kolenati are reviewed. Twenty-six species and subspecies are recognized, five of which are considered new. A further seven species are treated as *species incertae sedis*. A key is given for the identification of females.

INTRODUCTION

The present review of the genus *Steatonyssus* Kolenati is the second in a series of revisionary studies on the Macronyssinae (family Laelaptidae). The first, dealing with the genus *Pellonyssus* Clark and Yunker, was undertaken by Till (1964). Members of both genera differ from other macronyssines in having two distinct dorsal shields (the podonotal and opisthonotal) in the female. Species of *Steatonyssus* are, with few exceptions, ectoparasites of bats (Chiroptera) whereas those of *Pellonyssus* occur only on birds.

This study is based on material in the collections of the British Museum (Natural History) and on specimens kindly sent to us by Dr. V. Aellen, Muséum d'Histoire Naturelle, Geneva ; Dr. P. L. G. Benoit, Musée royal de l'Afrique centrale, Brussels ; Dr. F. Radovsky, George Williams Hooper Foundation, San Francisco and by Dr. F. Zumpt, South African Institute for Medical Research, Johannesburg. We have also examined type material from the Kolenati and Oudemans Collections by the kind permission of Dr. M. André, Paris, and Dr. L. van der Hammen, Leiden, respectively. Dr. N. Bregetova, Zoological Institute of the Academy of Sciences, Leningrad, kindly arranged for the loan of *Steatonyssus primus* Grokhovskaya et al. and *S. secundus* Grokhovskaya et al., and Dr. E. W. Baker, United States National Museum, allowed us to borrow types of Ewing's and Delfinado's species.

EXTERNAL MORPHOLOGY

The following account of the external morphology of the genus *Steatonyssus* refers to the active feeding stages only, the protonymph, female and male. We have not examined larvae or deutonymphs.

GNATHOSOMA :

The cheliceral shafts in the protonymph and female are relatively stouter than in members of the genus *Pellonyssus*, the second segment being two and one-half to six times as long as the first segment. The digits are slender, edentate and about 25–50μ in length (Text-fig. 3). In the males the second cheliceral segment is two to four times the length of the first. Both digits are essentially edentate in the male. The fixed digit is slender and has a rounded tip with an expanded hyaline margin. The movable digit, which has an overall length of at least two-thirds that of the second segment, consists of three parts, a dorsal process about as long as the fixed digit, a longer, grooved, ventral spermadactyl, and an intermediate hyaline process (Text-fig. 2).

The gnathosomal setae show a parasitoid arrangement. There are no well-defined corniculi and the deutosternal denticles are arranged in a single file (Text-fig. 1). The transparent, tongue-shaped tectum has a fimbriated apex (Text-fig. 4).

The pedipalp has five free segments and a two-tined apotele. In the female of all the known species except *Steatonyssus furmani* Tipton and Boese, a large process is developed on the antero-ventral surface of the palptrochanter. This process is not present in the males or in the protonymphs. The chaetotaxy of the pedipalp is shown in Text-fig. 6–7 and the chaetotactic formulae are as follows :—

Protonymph	(1 – 4 – 5 – 12 – 15)
Adult	(2 – 5 – 6 – 13 – 15)

The protonymphal pedipalpal chaetotaxy is normal but the chaetotaxy of the palptibia in the adult is unideficient, fourteen setae being normally present on this segment in the free-living Laelaptidae (Evans, 1964).

IDIOSOMA :

Dorsum. The dorsal sclerotization of the protonymph consists of a podonotal shield, two to four pairs of mesonotal scutellae and a pygidial shield (Text-fig. 48, 66). In the female the mesonotal and pygidial shields fuse to form the opisthonotal shield. In the males, except *S. furmani* which retains the female condition, all the dorsal shields fuse to form a single scutum which may be far more expanded than in the female.

In the few species examined (*S. antrozoi*, *S. calcaratus*, *S. javensis* s. lat., *S. longipes*, *S. periblepharus* and *S. tibialis*) the podonotal shield of the protonymph bears 11 pairs of setae, *i2* being present (Text-fig. 43). Unfortunately we have not been able to examine the protonymphs of any of the species which lack seta *i2* in the adult stage. On the posterior part of the dorsum setae *J1* – *J3* are situated on the striated integument. The pygidial shield usually bears three pairs of relatively long, stout setae (*Z4*, *Z5* and *S5*) and one pair of minute subterminal setae (*J5*). The subterminals are lacking in *S. antrozoi* and *S. calcaratus*, and also in *S. furmani* (Radovsky and Furman, 1963). Setae *J4* are absent throughout the genus. In the majority of species the female also bears 11 pairs of setae on the podonotal shield and seven pairs on the opisthonotal shield. However, setae *i2* may be lacking, as in *S. evansi*, *S. benoiti* and *S. sudanensis*, or additional marginal setae may be incorporated, thus increasing the number on the podonotal shield to 16 pairs as in *S. furmani*. The opisthonotal shield may lack the subterminal setae, as in *S. antrozoi*, *S. calcaratus*, *S. evansi* and *S. furmani*, or both the terminal and subterminal setae may be absent as in *S. benoiti* and *S. sudanensis*. Varying degrees of hypertrichy are also encountered, for example, in *S. eos*, *S. brucei*, *S. crassisetosus* and *S. nyassae*. In the male the chaetotaxy of the dorsal shield is usually the same as that of the combined anterior and posterior shields in the female, except that additional marginal setae are sometimes incorporated. In *S. brucei* and *S. crassisetosus* this process has gone further than in any of the other known species, the number of setae on the scutum exceeding 30 pairs.

Venter. The tritosternum in all stages resembles that of *Pellonyssus*, consisting of a narrow basal portion and a pair of laciniae. A hyaline denticulate membrane extends along the external margin of the base and continues as a narrow border along the laciniae.

The sternito-genital region in the protonymphs bears three pairs of sternal setae and one pair of genitals at the level of coxae IV (Text-fig. 67). A pair of metasternal setae (normally developed at the deutonymphal stage in the Gamasina) is present in the adults. In the female the posterior part of the sternal shield is differentiated to a varying degree from the anterior part, except in *S. furmani* in which there is no apparent distinction. The differentiation may be very slight and indicated only by the more narrowly spaced reticulations in the posterior area, as in *S. hipposideros* and in *S. javensis* s. lat. In most species, however, the posterior portion is heavily sclerotized and may form a dense band. The anterior part of the shield usually has a reticulate pattern similar to that of the presternal area. The shield bears the usual two pairs of pores, but it is not possible to distinguish a third pair near the metasternal setae. The anal shield shows very little variation in the species examined. It is triangular in the protonymphs, pear-shaped in the females, and the par- and postanal setae are subequal in length. The paranal setae are level with the posterior half of the anus except in *S. benoiti* and *S. eos* in which they are situated posterior to the anus. The ventral armature is fused to form a holoventral shield in all the known males except *S. furmani* which has three separate shields, sternito-genital, ventral and anal. The number of setae in the preanal region is subject to intraspecific variation. The genital orifice is presternal.

The chaetotaxy of the unsclerotized surface of the idiosoma of the adults shows interspecific variation with respect to the relative lengths and the form of the posterior setae. The peritremes are short in the protonymphs and extremely variable in length in the adults. In *S. longipes* and *S. tibialis* for example, they terminate at a point level with the middle of coxa III, whereas in *S. javensis* they extend as far as the anterior fourth of coxa II. In the females of some species, for example *S. brucei*, *S. nyassae*, *S. periblepharus* and *S. spinosus*, the peritrematal shields continue anteriorly in the form of broad, leaf-like structures which lie on the dorsal surface of the body over coxae I and II (Text-figs. 45, 62). In most of the American and also in some of the African species (e.g. *S. afer*, *S. eos*, *S. hipposideros*, *S. longipes*, *S. natalensis*, *S. sudanensis*) this shield is interrupted in front of the peritremes (Text-figs. 24, 34). The males do not have this expanded leaf-like portion, the peritrematal shields terminating in a short point immediately anterior to the peritreme. In all the adults examined the peritremes are fused posteriorly with the podal elements of coxa IV. Small endopodal plates are usually present between coxae III and IV and indistinct metapodal plates may be visible behind coxae IV.

Legs. As in the genus *Pellonyssus*, all the legs are six-segmented, excluding the terminal ambulacrum comprising a pulvillus and two claws. The femora and tarsi of all the legs are incompletely divided by transverse fissures and a lyriform fissure is present on the distal half of tarsi II–IV. The second coxa bears a pronounced antero-dorsal spine in all the species examined. In the usual position of the coxae in mounted specimens, this spine has a simple, triangular appearance. However, if the spine is viewed from a lateral angle its tip often appears denticulate (Text-fig. 5a, b).

In the protonymphal stage the chaetotaxy of the legs is the same as in the genus *Pellonyssus* (Till, 1964). In the females examined the chaetotaxy differs from that of *Pellonyssus* in several respects. Legs I and II have the typical laelaptid pattern as defined by Evans (1963). Seta v_4 is present on femur I, whereas it is absent in all the *Pellonyssus* species except *P. reedi*. Tibia I bears seta pd_3 in all the *Steatonyssus* species examined, except *S. sudanensis*, but lacks this seta in all the *Pellonyssus* species. On femur III the ventral seta is always proximal to the fissure in *Steatonyssus*, but may be either proximal or distal in *Pellonyssus*. Tibia III has ten setae in *S. tibialis*, ad_2 being present ($2-\frac{2}{1}, \frac{2}{1}-2$), but nine in all the other species examined, as in *Pellonyssus*. Free-living laelaptids have only eight setae on tibia III. Genu IV has only one postero-lateral seta, whereas all the *Pellonyssus* species have two. Tibia IV has 11 setae in *S. tibialis*, ad_2 being present ($2-\frac{2}{1}, \frac{3}{1}-2$), whereas in all the other species examined there are only ten setae, as in *Pellonyssus* and the free-living Laelaptidae. The typical chaetotactic formulae for the femora, genua and tibiae of the legs of the adults may be expressed as follows :—

	I	II	III	IV
Femur	$2-\frac{5}{4}-2$	$2-\frac{5}{3}-1$	$1-\frac{3}{1}-1$	$1-\frac{3}{1}-1$
Genu	$2-\frac{3}{2}, \frac{3}{1}-2$	$2-\frac{3}{1}, \frac{2}{1}-2$	$2-\frac{2}{1}, \frac{2}{1}-2$	$2-\frac{2}{1}, \frac{3}{1}-1$
Tibia	$2-\frac{3}{2}, \frac{3}{1}-2$	$2-\frac{2}{1}, \frac{2}{1}-2$	$2-\frac{1}{1}, \frac{2}{1}-2$	$2-\frac{1}{1}, \frac{3}{1}-2$

CLASSIFICATION

There is considerable confusion in the literature concerning the status of certain species which have been assigned to the genus *Steatonyssus*. When Kolenati (1858) erected the genus he included in it only two species, *S. periblepharus* Kol. and *S. brachypeltis* Kol. The latter is now considered a junior subjective synonym of the former which becomes the type of the genus. In 1922 Hirst proposed the taxon *Liponyssus chiropteralis* for a species having two dorsal shields and living on bats in Europe and North Africa because he was unable to relate the species with certainty to *S. periblepharus*, *Liponyssus musculi* (Koch) Oudemans or *Dermanyssus arcuatus* Koch. Oudemans (1936) considered both Kolenati's and Hirst's species, as well as *Dermanyssus murinus* Lucas, 1840 and *D. avium* Wagner, 1841, to be synonyms of *Dermanyssus vespertilionis* Dugès, 1834.

We have examined the type material of *L. chiropteralis* and *S. periblepharus* and are able to confirm that they are conspecific. The type material of *D. murinus*, *avium* and *vespertilionis* must be presumed to be lost and their original descriptions are such as to make their specific identity impossible. The continued use of these names can only lead to further confusion and we, therefore, regard them as *species incertae sedis*.

Acarus musculi Schrank, 1803, a mite found on the skin of a house mouse, is the oldest described species assigned to the genus *Steatonyssus*. The original description, quoted by Oudemans (1936), is based on the shape and colour of the mite and is certainly not adequate for the certain identity of the species. The type material is not available but as there are no confirmed records of a *Steatonyssus* from mice, it seems unlikely that Schrank's mite can belong to this genus. Oudemans

(1936) lists *Dermanyssus musculi* Koch, 1836, also from house mice, as a synonym of *A. musculi*. The mite described by Oudemans (1902a) as *Liponyssus musculi* (Koch) is undoubtedly a *Steatonyssus* but it was collected from a bat and not a mouse, whereas the " deutonymph " of *L. musculi* described by him in 1903 (also from a bat) certainly does not represent a *Steatonyssus*—it is probably a protonymph of *Macronyssus*. In later papers (1912, 1913a & b) Oudemans lists bats and mice as hosts of *L. musculi* (Koch). It is obvious that *Liponyssus musculi* sensu Oudemans represents more than one species and the confusion has probably arisen because some of the records were based on immature stages which could not be identified with certainty at that time.

By courtesy of Dr. van der Hammen we have examined slide No. 2355 from the Oudemans Collection which is labelled " *Steato* (*Cerato-*) *nyssus musculi* Koch, from *Mus musculus albus*, Hamburg, July, 1921. The specimens represent six females of *Ornithonyssus bacoti* (Hirst)! This suggests that *A. musculi* Schrank and *D. musculi* Koch might possibly be conspecific with *O. bacoti*.

Strandtmann and Wharton (1958) consider *Liponyssus pipistrelli* Oudemans, 1904 to be a synonym of *Steatonyssus musculi* (Schrank). The specimen labelled *Liponyssus pipistrelli* from *Plecotus auritus*, Bodegraven, VIII, 1892, in the Oudemans Collection is a protonymph of *Macronyssus*. We cannot be sure, however, that this is the type specimen (see Buitendijk, 1945).

Liponyssus cyclaspis Oudemans (1906 a & b), which is known only from the protonymph, is also a species of *Macronyssus*. This is indicated in the drawing of the dorsum of the mite by Oudemans (1915) and has been confirmed by the examination of the type.

The systematic position of *Steatonyssus biscutatus* (Hirst) and consequently of the closely related *Pellonyssus trachyphoni* Till is somewhat problematical, as these species have some characters in common with *Steatonyssus* and others which are typical of *Pellonyssus* (Till, 1964). The features which they share with all *Steatonyssus* are the relatively large sternal shield in the female, the presence of metasternal setae and the position of the ventral seta on femur III. In common with all *Pellonyssus* they lack seta *i2* on the podontal shield and seta pd_3 on tibia I, and have two postero-lateral setae on genu IV. The chelicerae of the male of *P. trachyphoni* have the typical *Pellonyssus* and not the *Steatonyssus* structure. However, neither genus is completely homogeneous. Three of the *Steatonyssus* species, for example, lack seta *i2*, and *Pellonyssus similis* (Zumpt and Till) has a proximally situated ventral seta on femur III. The process on the palptrochanter is also a variable feature. It is present in half the known species of *Pellonyssus* and in all except one of the species of *Steatonyssus*. In fact the only reliable " key character " which can be used to separate the two genera is the chaetotaxy of genu IV, *Pellonyssus* having two postero-lateral setae on this segment and *Steatonyssus* only one. Clark and Yunker (1956) included *S. biscutatus* in their new genus *Pellonyssus* but Radovsky and Yunker (1963) restored it to the older combination. For the present we prefer to leave these two species in the genus *Pellonyssus*, with other bird-infesting forms.

Steatonyssus furmani Tipton & Boese displays a number of morphological features which immediately separate it from the other species which we have included in the genus *Steatonyssus*. In the female, the palptrochanter lacks an antero-lateral process and the podonotal shield carries sixteen pairs of setae. The male of *S. furmani* is unique in having two subequal dorsal shields (as in the female) and in having three distinct ventral shields (a sternito-genital, a ventral and an anal). On the basis of these morphological differences we propose a new subgenus *Steatonyssella* for the reception of *S. furmani* which becomes its type species.

DESCRIPTIONS OF SPECIES

Genus ***STEATONYSSUS*** Kolenati *s. lat.*

Steatonyssus Kolenati, F. A. 1858. *Wien. ent. Monatschr.*, **2** : 6 ; 1859 *S. B. Akad. Wiss. Wien*, **35** : 186.
Bregetova, N. 1956. *Acad. Sci. U.S.S.R. Moscow*, **61** : 161.
Strandtmann, R. W. & Wharton, G. W. 1958. Manual of Mesostigmatid mites. *Contr. Inst. Acarology, Maryland*, No. 4.
Zumpt, F. & Till, W. M. 1961 in Zumpt, *Publ. S.A. Inst. Med. Res.*, **9** : 56.
Ceratonyssus Ewing, H. E. 1923. *Proc. U.S. nat. Mus.*, **62** (2459) : 6.

TYPE : *Steatonyssus periblepharus* Kolenati, 1858.

KEY TO FEMALES OF THE GENUS *Steatonyssus* KOL. *s. lat.*

1 Palptrochanter with strong process (Text-fig. 7) ; podonotal shield with not more than 13 pairs of setae (subgenus *Steatonyssus*) 2
– Palptrochanter without process ; podonotal shield with 16 pairs of setae (subgenus *Steatonyssella*) . . . . ***S. furmani*** Tipton & Boese (p. 574)
2 Coxa III with pronounced spur bearing the posterior seta ***S. calcaratus*** Radovsky & Yunker (p. 531)
– Coxa III without such spur 3
3 Podonotal shield lacking seta *i*2 (Text-fig. 28) 4
– Podonotal shield with seta *i*2 (Text-fig. 62) 6
4 Opisthonotal shield with six pairs of setae (Text-fig. 28) . ***S. evansi*** Delfinado (p. 540)
– Opisthonotal shield with five pairs of setae (Text-figs. 8, 72) 5
5 Tibia I lacking seta pd_3 ; coxae II and III with spine-like posterior setae (Text-fig. 73) . . . . ***S. sudanensis*** (Hirst) (p. 569) .
– Tibia I with seta pd_3 ; coxae II and III with simple setae (Text-fig. 9) ***S. benoiti*** sp. nov. (p. 526)
6 Opisthonotal shield with setae *Z*5 about two and one-half times as long as the longest postero-marginal setae on the shield (Text-fig. 70) ***S. spinosus*** Willmann (p. 567)
– Opisthonotal shield with setae *Z*5 at the most only slightly longer than the longest postero-marginal setae 7
7 Tibia III with four dorsal setae ; tibia IV with five dorsal setae ***S. tibialis*** sp. nov. (p. 570)
– Tibia III with three dorsal setae ; tibia IV with four dorsal setae 8
8 Opisthonotal shield with six pairs of setae (subterminals absent) (Text-fig. 68) . 9
– Opisthonotal shield with seven or more pairs of setae (subterminals present) (Text-fig. 62) 10
9 Podonotal shield with 11 pairs of setae ; posterior margin of sternal shield with a strongly sclerotized band . . . . ***S. antrozoi*** Radovsky & Furman (p. 524)

– Podonotal shield with 13 pairs of setae (Text-fig. 68) ; posterior margin of sternal shield without a strongly sclerotized band . . . ***S. radovskyi*** sp. nov. (p. 566)

10 Opisthonotal shield with seven pairs of setae 11

– Opisthonotal shield with more than seven pairs of setae (unpaired setae often present) 21

11 Sternal setae I very short, not more than one-half the length of sternal setae II (Text-fig. 63) . . . . ***S. periblepharus*** Kolenati (p. 562)

— Sternal setae I at least two-thirds the length of sternal setae II (Text-fig. 17) . 12

12 Dorsal setae *i*2 minute, slender, at the most one-third the length of setae *i*3 (Text-figs. 16, 50) 13

– Dorsal setae *i*2 stronger, about one-half or more the length of setae *i*3 (Text-fig. 58) 15

13 Dorsal setae *i*3 about one-third the length of setae *z*1 (Text-fig. 16) ***S. ceratognathus*** (Ewing) (p. 532)

– Dorsal setae *i*3 almost two-thirds the length of setae *z*1 (Text-fig. 50) . . . 14

14 Dorsal setae *i*5 and *z*3 subequal in length ; opisthonotal shield tapering strongly in its proximal third . . . ***S. emarginatus*** Radovsky & Furman (p. 537)

– Setae *i*5 not more than two-thirds the length of *z*3 ; opisthonotal shield not tapering strongly in its proximal third (Text-fig. 50) . . ***S. joaquimi*** (Fonseca) (p. 553)

15 Sternal shield with a strongly sclerotized band posteriorly (Text-fig. 59) . . 16

– Sternal shield without such a sclerotized band, the shield having at the most, a more strongly defined area of ornamentation posteriorly (Text-figs. 40, 47) . 17

16 Setae *J*1–*J*3 relatively long ; length of seta *J*2 about equal to three-quarters the distance between the bases of *J*2 and *J*3 . ***S. afer*** Radovsky & Yunker (p. 521)

– Setae *J*1–*J*3 conspicuously shorter ; length of seta *J*2 about equal to one-third the distance between the bases of *J*2 and *J*3 (Text-fig. 58) ***S. occidentalis*** (Ewing) (p. 559)

17 Setae on the unsclerotized integument of the opisthonotum short (approx. 12–27µ in length) . . . . ***S. javensis*** (Oudemans) s. lat. (p. 547)

– Setae on the unsclerotized integument of the opisthonotum considerably longer and stronger (more than 50µ in length) 18

18 Peritreme reaching to the level of the anterior region of coxa II (Text-fig. 34) ***S. hipposideros*** Till (p. 544)

– Peritreme scarcely extending beyond the level of the posterior margin of coxa II . 19

19 Length of tarsus IV at least five times its basal width ; peritreme very short, reaching to about the middle of coxa III . ***S. longipes*** Radovsky & Yunker (p. 554)

– Length of tarsus IV less than four-and-one-half times its basal width ; peritreme longer, reaching up to or slightly beyond the level of the anterior margin of coxa III 20

20 Length of seta *J*2 about equal to one-third the distance between *J*2 and *J*3 ; antero-dorsal spur on coxa II with a broad, flattened serrated tip ***S. aelleni*** Radovsky & Yunker (p. 521)

– Length of seta *J*2 about equal to one-half the distance between *J*2 and *J*3 ; antero-dorsal spur on coxa II with a pointed tip lacking distinct serrations ***S. natalensis*** Zumpt & Patterson (p. 555)

21 Paranal setae some distance posterior to the anus. Posterior margin of the sternal shield not heavily sclerotized, anterior part of the peritrematal shield separate (Text-figs. 24, 25) . . . . ***S. eos*** Zumpt & Till (p. 538)

– Paranal setae never behind the posterior margin of anus. Posterior margin of sternal shield strongly sclerotized ; anterior part of the peritrematal shield continuous 22

22 Opisthonotal shield relatively broad, length not more than 1·2 times the width ; anterior process of the genital shield relatively short and broad (Text-figs. 30, 31) ***S. faini*** Delfinado (p. 542)

– Opisthonotal shield relatively slender, length at least 1·4 times the width ; anterior process of the genital shield relatively long, narrow, sharply pointed (Text-figs. 13, 21) 23

23 Setae *i2* of the podonotal shield long, extending up to or beyond the bases of setae *i3* (Text-fig. 56) . . . . **S. nyassae** (Hirst) (p. 558)

– Setae *i2* of the podonotal shield considerably shorter, reaching to about one-half the distance between the bases of setae *i2* and *i3* (Text-fig. 12) 24

24 Setae *S5* on the opisthonotal shield less than three-quarters the length of the terminals (*Z5*) ; posterior integumental setae stout, tapering gradually (Text-fig. 12) . . . . **S. brucei** Lavoipierre (p. 528)

– Setae *S5* on the opisthonotal shield longer than the terminals (*Z5*) ; posterior integumental setae rod-like, tapering only at the tips (Text-fig. 20) **S. crassisetosus** sp. nov. (p. 534)

Subgenus ***STEATONYSSUS*** *s. str.*

Steatonyssus (Steatonyssus) aelleni Radovsky & Yunker

Steatonyssus aelleni Radovsky & Yunker, 1963. J. Parasit., **49,** 337, figs. 28–33.

The female and protonymph of this species were adequately described by Radovsky & Yunker (1963). The male is unknown.

The female of this species is very close to *S. natalensis* Zumpt & Patterson, differing only in certain of its measurements and in having the antero-dorsal spur of coxa II with a broad, flattened, serrate tip.

Podonotal shield 320μ long, 250μ wide between setae *z3*. Length of setae *i2* equal to two-thirds the distance between setae *i4* and *z2*. Opisthonotal shield 390μ long, 195μ wide at level of setae *J1*. Length of seta *J2* approximately one-third the distance between *J2* and *J3*. Sternal shield 55μ long, 138μ wide between second pair of setae. Chaetotaxy of legs typical for the genus. Length of tibia I, 90μ ; tarsus I, 156μ ; tibia IV, 96μ ; tarsus IV, 180μ ; basal width of tarsus IV, 40μ.

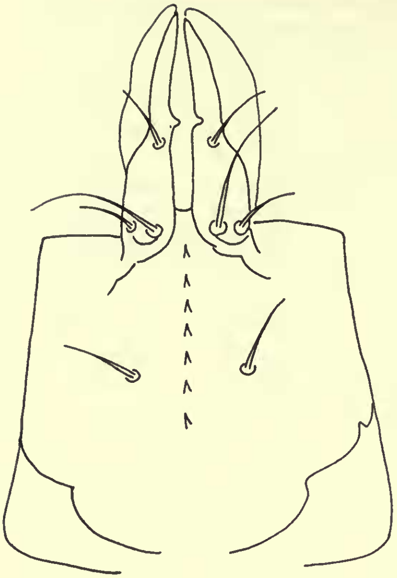
Host and *Locality* : *Rhinolophus foxi* Thomas from the Cameroons (holotype lent by U.S. National Museum).

Steatonyssus (Steatonyssus) afer Radovsky and Yunker

Steatonyssus afer Radovsky & Yunker 1963, J. Parasit., **49** : 335, figs. 10–16.

FEMALE. Deutosternum has 7 teeth arranged in a single file. Basal segment of chelicera 30μ, second segment 90μ, chelae 40μ long.

Podonotal shield 276μ long, 216μ wide between setae *z3*, bearing eleven pairs of setae. Setae *i2* slightly shorter than, and setae *i4* one and a half times the distance between *i4* and *z2*. Seta *i2* about two-thirds the length of *i3* ; seta *i3* about three-quarters the length of *z1* ; setae *i5* and *z3* subequal. Opisthonotal shield concave anteriorly, 330μ long, 180μ wide at level of setae *J1*, bearing 7 pairs of setae. Terminal setae longer than the subterminals but shorter than the postero-lateral setae. Length of seta *J2* about three-quarters the distance between *J2* and *J3*. Both shields are reticulate.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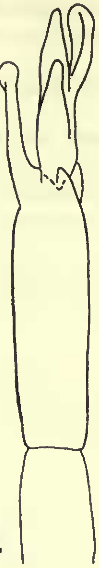
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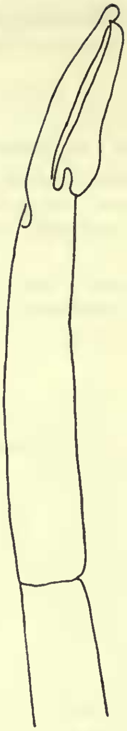
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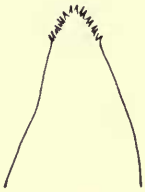
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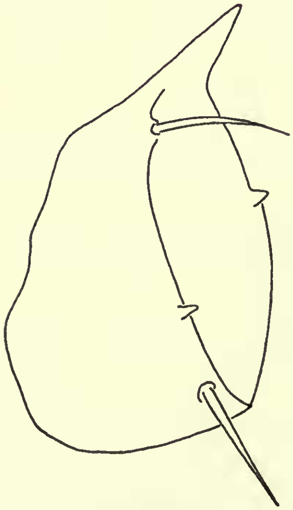
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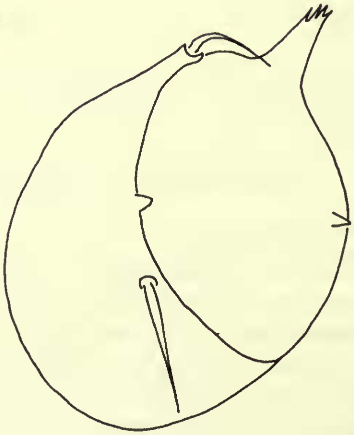
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Figs. 1–4. *Steatonyssus* (*Steatonyssus*) *periblepharus* Kolenati. Gnathosoma of female (fig. 1); chelicera of male (fig. 2); chelicera of female (fig. 3); tectum (fig. 4).
Figs 5a–b. *Steatonyssus* (*Steatonyssus*) *brucei* Lavoipierre. Coxa II in different positions.

Sternal shield not sharply demarcated from reticulate presternal area, lateral margins indistinct, posterior region heavily sclerotized. Length of shield about 57μ, width between second pair of setae 110μ. First sternal seta about three-quarters the length of the second and a little more than half as long as the third. Genital shield 144μ long from level of genital setae, 75μ wide between the setae ; length of genital setae about three-quarters the distance between their bases. Anal shield 120μ long to base of postanal seta, 80μ wide through middle of anus. Paranal setae near posterior margin of anus, about four-fifths as long as postanal seta.

Integument of idiosoma bears about 120 pairs of setae ; those on the dorsum and the posterior part of the venter are longer and stouter than the mid-ventral setae. The longest postero-dorsal setae measure 66μ. Peritremes terminate at a point a little beyond the anterior margin of coxa III in the paratype examined, and to the posterior fourth of coxa II in the specimens from Sierra Leone. The peritrematal shield is interrupted, the separated anterior part lying over coxae I and II. Small endopodal shields are present between coxae III and IV and a pair of weakly sclerotized metapodal shields is situated behind coxae IV.

Chaetotaxy of the legs follows the typical *Steatonyssus* pattern. Coxa II bears a sharply pointed antero-dorsal spine. In a specimen from Sierra Leone, in which the second coxa is distorted in position, the spine appears to have a serrated margin with 4 tiny denticles. Length of tibia I, 87μ ; tarsus I, 135μ ; tibia IV, 90μ and tarsus IV, 170μ ; basal width of tarsus IV, 40μ.

MALE. Basal segment of chelicera 24μ, second segment 63μ, spermadactyl 36μ long. Dorsal shield 504μ long, 192μ wide between setae *z*3, bearing 19 pairs of setae. The shield has a reticulate pattern, except on the posterior tip, which is striated.

Holoventral shield narrow, reticulate, bearing 3 pairs of sternal setae, one pair of genitals, 8 ventral setae and 3 anals. The metasternal setae are situated on the striated integument beside the holoventral shield.

Integument of idiosoma bears 45 pairs of setae similar in appearance to those on the female. Peritremes terminate slightly behind the anterior margin of coxa III ; peritrematal shield extends to posterior fourth of coxa II. Endopodal shields are present at the level of coxae IV and a pair of weakly sclerotized metapodal shields is situated behind coxae IV.

Chaetotaxy of legs as in the female ; anterior seta of coxa III has an anterior, plate-like extension of the basal two-thirds. Length of tibia I, 70μ ; tarsus I, 112μ ; tibia IV, 66μ, and tarsus IV, 117μ.

PROTONYMPH. Not known.

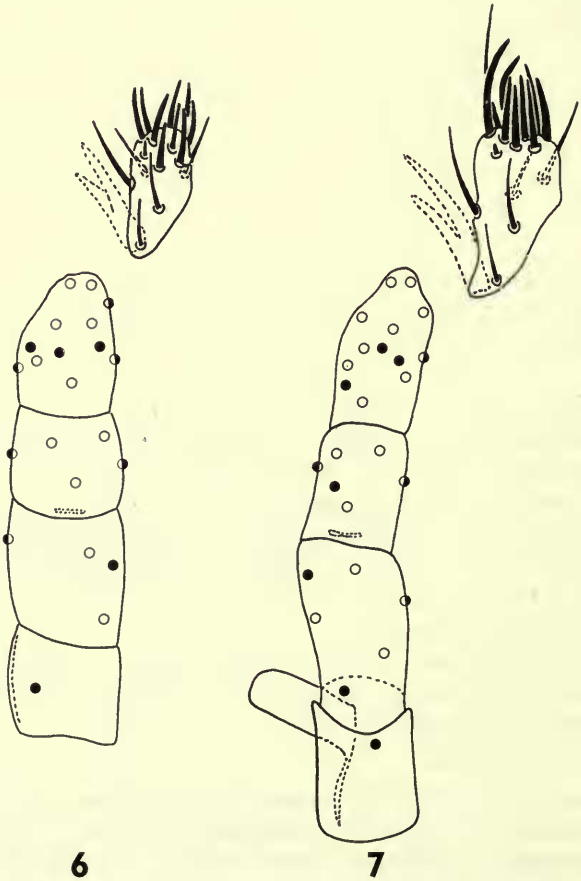
HOSTS AND LOCALITIES. *Nycteris macrotis* Dobson from Lunda, Dundo, Angola (1 ♀ paratype presented by Dr. F. Radovsky). Mixed collection of *Eptesicus tenuipinnis* (Peters) and *Pipistrellus nanus* (Peters), Lunda, Dundo, Angola (1 ♂ paratype presented to B.M.N.H.). Radovsky & Yunker (1963) have recorded one female paratype from the latter host. " Small bat ", Njala, Sierra Leone, collected by E. Hargreaves. [Material in British Museum (Natural History).]

Steatonyssus (Steatonyssus) antrozoi Radovsky & Furman

Steatonyssus antrozoi Radovsky & Furman 1963, Ann. ent. Soc. Amer. **56** : 269, figs. 1–7, 9, 16, 19–21.

FEMALE. Deutosternum has 8 teeth arranged in a single file. Basal segment of chelicera 40μ, second segment 108μ, chela 50μ long.

Podonotal shield 300μ long, 250μ wide between setae *z*3. It bears eleven pairs of setae, *i*2 being about two-thirds as long as *i*3 ; the lengths of setae *i*4 and *z*2 are approximately equal to the distance between their bases. Seta *i*3 about three-quarters as long as *z*1, setae *i*5 and *z*3 subequal. Opisthonotal shield concave anteriorly, 354μ long, 186μ wide at the level of setae *J*1. The shield bears 6 pairs of setae, the three posterior pairs being minute. Length of seta *J*2 slightly less than half the distance between the bases of *J*2 and *J*3. Both shields are reticulate, the opisthonotal shield having longitudinal striations near its tip.



FIGS. 6–7. *Steatonyssus* (*Steatonyssus*) *periblepharus* Kolenati. Right pedipalp of protonymph (dorsal view) with tarsus (ventral view), fig. 6 ; right pedipalp of female (dorsal view) with tarsus (ventral view), fig. 7.

Sternal shield 48μ long, 114μ wide between setae II. Anterior part of shield reticulate, not sharply demarcated from the reticulate presternal area ; posterior portion thickened and granular in appearance. Sternal seta I is three-quarters as long as seta III and the same length as seta II. Genital shield 144μ long from level of genital setae, 60μ wide between the setae. Length of genital setae slightly less than the distance between their bases. Anal shield 114μ long to base of postanal seta, 80μ wide through middle of anus. Paranal setae level with posterior fourth of anus, approximately the same length as the postanal seta.

Integument of idiosoma bears about 95 pairs of setae. The ventral ones are slender, finely tapering, the dorsal ones are thicker, tapering near their tips ; those near the posterior end of the body are the thickest and have a maximum length of 45μ. The peritreme extends approximately to the posterior third of coxa II. The separated, anterior, leaf-like part of the peritrematal shield lies on the dorsum and extends from the middle of coxa II to the middle of coxa I. Endopodal shields are present between coxae III and IV ; one pair of roughly oval metapodal shields is situated behind coxae IV.

Chaetotaxy of the legs typical for the genus. Coxa II has a long, pointed, antero-dorsal spine. Length of tibia I, 84μ ; tarsus I, 150μ ; tibia IV, 90μ ; tarsus IV, 168μ ; basal width of tarsus IV, 45μ.

MALE. Basal segment of chelicera 30μ, second segment 66μ, spermadactyl 48μ long. Dorsal shield 528μ long, 210μ wide between setae *z*3 ; it is reticulate anteriorly, striate posteriorly, and bears 18 pairs of setae, the three posterior pairs being very minute.

Holoventral shield reticulate anteriorly, striate posterior to the genital setae, bearing 4–8 setae in the preanal region. The metasternal setae are situated on the integument beside the shield. Integument of idiosoma bears about 52 pairs of setae. Peritreme extends to posterior fourth of coxa II ; endo- and metapodal shields as in the female.

Chaetotaxy of legs as in the female. Anterior seta of coxa III with an anterior expansion near its base. Length of tibia I, 70μ ; tarsus I, 120μ ; tibia IV, 72μ, and tarsus IV, 114μ.

PROTONYMPH. Podontal shield 192μ long, 132μ wide between setae *z*3. Pygidial shield 42μ long, 105μ wide. It bears a pair of relatively short anterior setae and two pairs of longer and stouter posterior setae. The subterminal setae are absent as in the female. Two pairs of mesonotal scutellae are present at the level of setae *J*1–*J*2. Anal shield 40μ long to base of postanal seta, 50μ wide through middle of anus. Integument of venter bears 5 pairs of setae in addition to the genitals.

Chaetotaxy of the legs normal. Posterior setae on coxae II and III inflated basally ; distal antero-dorsal seta on femur IV stouter than any of the other leg setae. Length of tibia I, 36μ ; tarsus I, 60μ ; tibia IV, 42μ, and tarsus IV, 72μ.

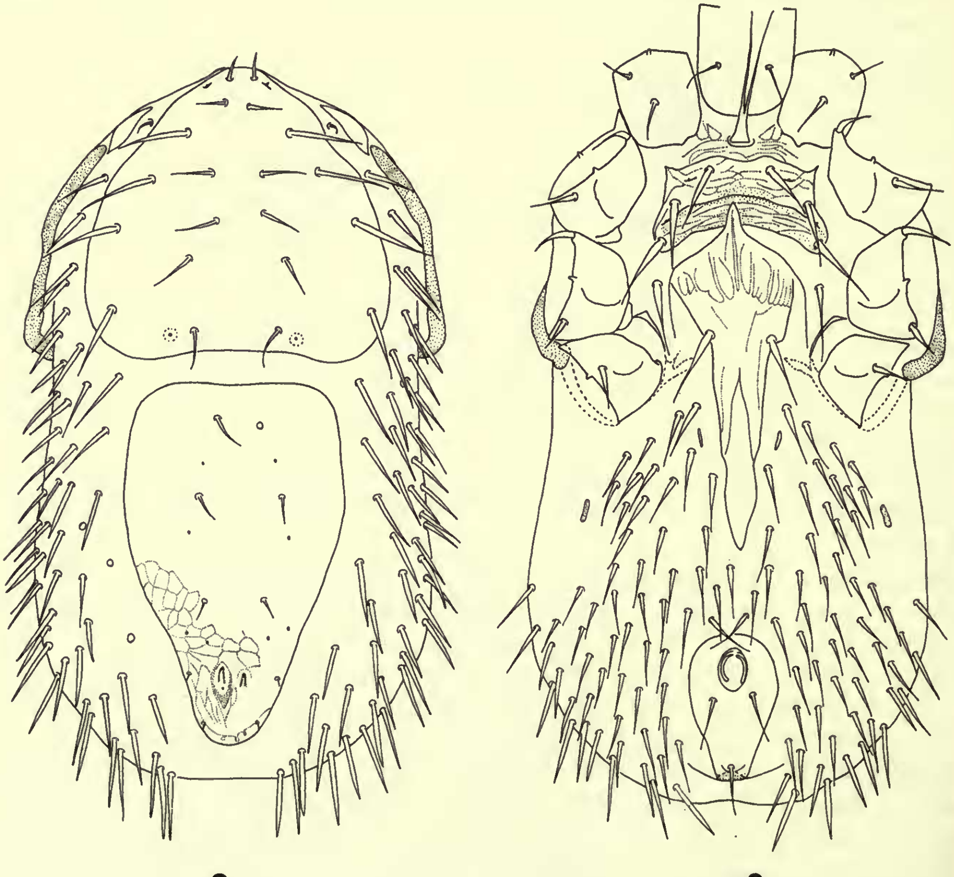
HOSTS AND LOCALITIES. *Antrozous pallidus pacificus* Merriam from Capay, Yolo Co., California, U.S.A. (Two male, 4 female and 2 protonymphal paratypes presented to B.M.N.H.) *Eptesicus fuscus* (Palisot de Beauvois), Oklahoma and Texas, U.S.A. (recorded by Radovsky & Furman, 1963).

Steatonyssus benoiti sp. nov.

FEMALE (Text-figs. 8–9). Deutosternum has 9 teeth. Basal segment of chelicera 30–33μ long, second segment 105–108μ, chelae 33μ long.

Podontal shield 264–288μ long, 234–258μ wide between setae *z*3. Setae *i*2 absent, seta *i*3 approximately half as long as *z*1. Length of setae *i*4 and *z*2 slightly less than the distance between their bases ; seta *i*5 about half as long as *z*3. Opisthonotal shield 324–350μ long, 186–210μ wide at the level of setae *J*1. It bears 5 pairs of setae, both the terminals and subterminals being absent. Length of seta *J*2 less than a quarter the distance between *J*2 and *J*3. Both shields have a reticulate pattern.

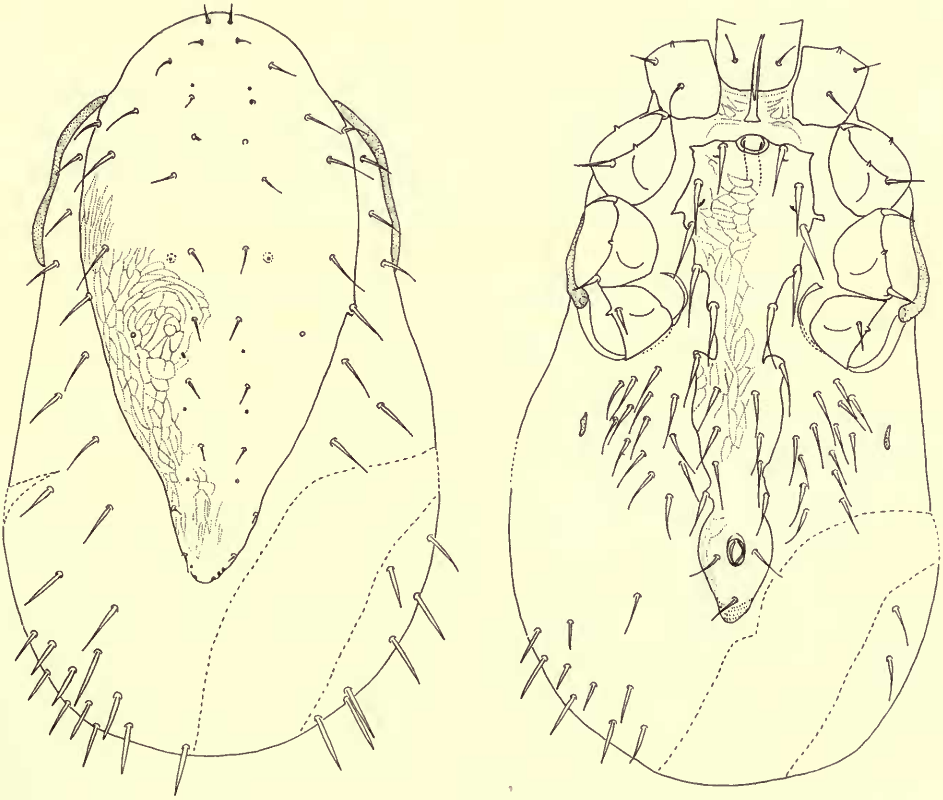
Sternal shield not very sharply demarcated from the reticulate presternal area ; length 60–63μ, width between setae II 123–132μ. The posterior part of the shield



FIGS. 8–9. *Steatonyssus* (*Steatonyssus*) *benoiti* sp. nov. Dorsum (fig. 8) and venter (fig. 9) of female.

is more heavily sclerotized than the anterior part ; the reticulations are more narrowly spaced in the posterior region and there appears to be some granulation. The sternal and metasternal setae are subequal in length. Genital shield relatively long and narrow, with a rather broad antero-median projection extending over the sternal shield. Length from level of genital setae 190–207μ, width between the setae 50–60μ ; length of genital setae about one and a half times the distance between their bases. Anal shield 123–129μ long to base of postanal seta, 78–84μ wide through middle of anus.

Integument of idiosoma bears numerous setae. The ventral ones are inflated basally, tapering rapidly to form long, slender points ; the marginal and dorsal ones taper more gradually and have a maximum length of 66μ. Peritremes long and relatively broad ; they curve onto the dorsum and terminate at a point level approximately with the middle of coxa II. The peritrematal shield is interrupted and the anterior leaf-like portion lies over coxae I and II. Endopodal shields are



FIGS. 10–11. *Steatonyssus* (*Steatonyssus*) *benoiti* sp. nov. Dorsum (fig. 10) and venter (fig. 11) of male.

present between coxae III and IV, and a pair of elongate metapodal shields is situated behind coxae IV.

Chaetotaxy of the legs follows the typical *Steatonyssus* pattern. Coxa II has an antero-dorsal spine and coxae II–IV have slightly curved, sclerotized ridges on the ventral surface. Length of tibia I, 87–93μ ; tarsus I, 150–168μ ; tibia IV, 99–102μ; tarsus IV, 190–204μ ; basal width of tarsus IV, 45μ.

MALE (Text-figs. 10–11). Only one slightly damaged specimen is present, in which the deutosternum is provided with 6 teeth. Dorsal shield entire, reticulate, with 17 pairs of setae, i.e. including two marginal pairs which are not placed on the shield in the female. Length of shield 552μ, width between setae *z*3 is 222μ.

Holoventral shield narrow, reticulate, with 4 pairs of setae in the sternal region, one pair of genitals, 5 pairs in the preanal region, and the usual 3 anal setae. Integument of idiosoma bears 37 pairs of setae, the marginal and dorsal ones tapering more gradually than the ventral ones, as in the female.

Chaetotaxy of the legs as in the female. Length of tibia I, 80μ ; tarsus I, 135μ ; tibia IV, 90μ, and tarsus IV, 153μ.

PROTONYMPH. Not known.

HOSTS AND LOCALITIES. *Rhinolophus landeri lobatus* Peters, collected by N. Leleup from the Grotte Defrenne, Kakontwe, Congo, 19th September, 1948. Holotype (♀), allotype and 12 female paratypes in the Musée royal de l'Afrique Centrale, Tervuren, Belgium. Seven female paratypes (1963.11.11.53–59) in the collection of the British Museum (Natural History), London.

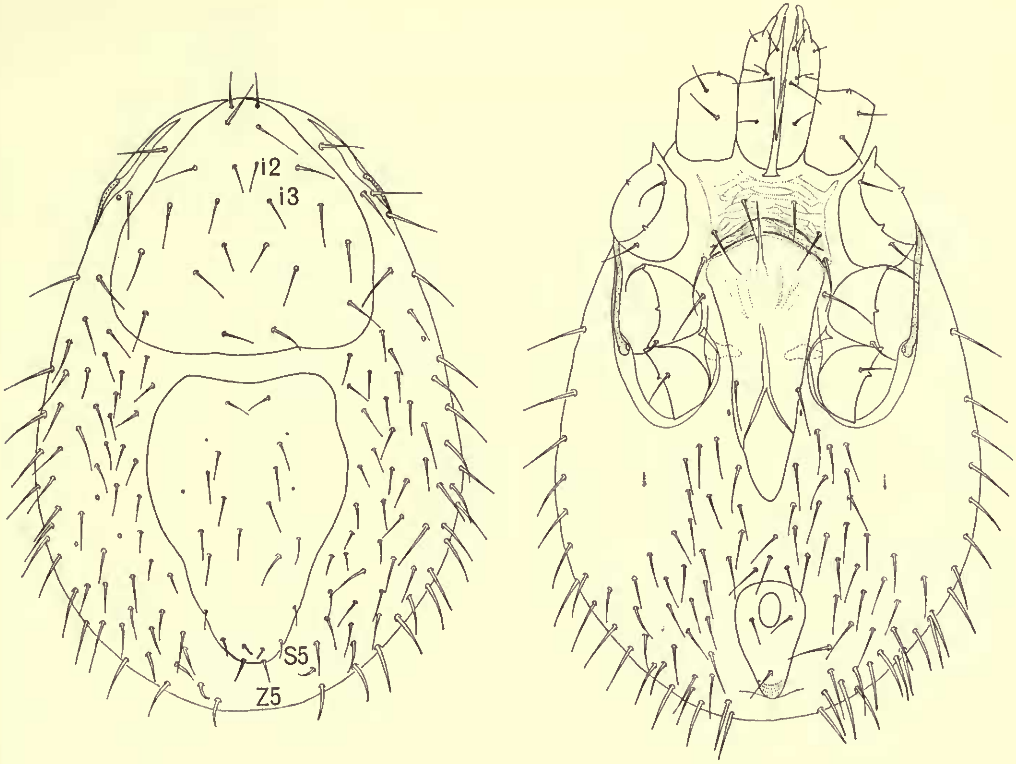
Steatonyssus (Steatonyssus) brucei Lavoipierre

Steatonyssus brucei Lavoipierre 1956, Ann. trop. Med. Parasit. **50** : 295, figs. 3–4.

FEMALE (Text-figs. 12–13). Deutosternum has 7 teeth arranged in a single file. Process on palp trochanter elongate, finger-like. Basal segment of chelicera 27μ, second segment 120μ and chela 42μ long.

Podonotal shield 246–270μ long, 198–210μ wide between setae *z*3, bearing eleven pairs of setae. Setae *i*2–*i*5 subequal, their lengths less than the distance between the bases of setae *i*4 and *z*2. Setae *i*3 and *i*5 are approximately three-quarters the lengths of *z*1 and *z*3 respectively. Opisthonotal shield 270–285μ long, 168–174μ wide at the level of setae *J*1, bearing 20–22 setae which are not all symmetrically arranged. The subterminal setae (*J*5) are about half as long as the terminals (*Z*5). Both shields have a reticulate pattern.

Sternal shield 36–40μ long (from level of setae I), 102μ wide between the second pair of setae. The shield and presternal area are both reticulate and not clearly demarcated from one another. The posterior border of the shield is reticulate and granular and very heavily sclerotized. The sternal setae are more or less subequal in length, the third pair being slightly longer than the first. Genital shield 114–120μ long from the level of the genital setae, 60–66μ wide between the bases of the setae ; length of setae nearly equal to the distance between their bases. The posterior



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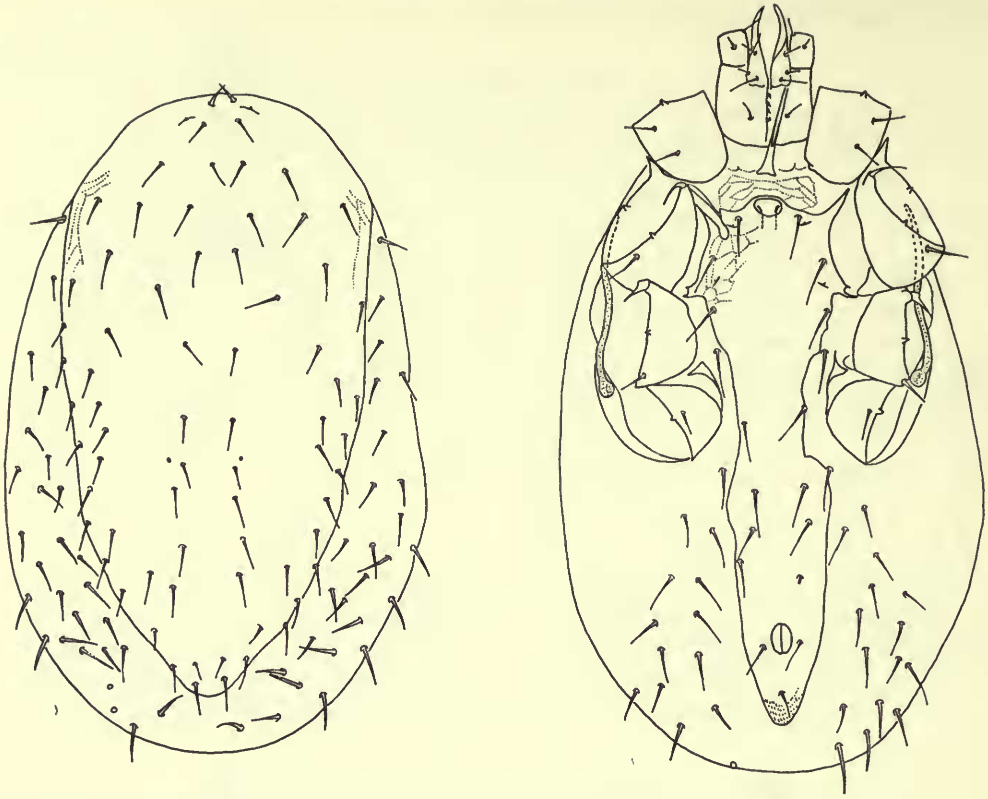
FIGS. 12–13. *Steatonyssus* (*Steatonyssus*) *brucei* Lavoipierre. Dorsum (fig. 12) and venter (fig. 13) of female.

part of the shield bears a pair of well-defined lines which converge near the middle of the shield. Anal shield 90–96μ long to base of postanal seta, 66–70μ wide through middle of anus. Paranal setae a little in front of the posterior margin of the anus.

Integument of idiosoma bears numerous dorsal and ventral setae, those near the margin of the body being relatively stout and spine-like. The postero-dorsal setae have a maximum length of 45μ. Peritremes long, the anterior tips curving onto the dorsum and terminating at a point anterior to the middle of coxa II. The peritrematal shields continue to the middle of coxa I. Endopodal shields present between coxae III and IV and a pair of rather indistinct, oval, metapodal shields is situated behind coxae IV.

The chaetotaxy of the legs follows the typical pattern for this genus. Length of tibia I, 84–87μ ; tarsus I, 150μ ; tibia IV, 75–78μ ; and tarsus IV, 150–165μ ; basal width of tarsus IV, 36μ.

MALE (Text-figs. 14–15). The number of deutosternal teeth cannot be determined. Dorsal shield 414μ long, 144μ wide between setae *z*3, with an overall reticulate



Figs. 14–15. *Steatonyssus* (*Steatonyssus*) *brucei* Lavoipierre. Dorsum (fig. 14) and venter (fig. 15) of male.

pattern. It bears 69 setae ; the lateral ones on the posterior part of the shield are not symmetrically arranged.

Holoventral shield narrow, reticulate, bearing 3 pairs of sternal setae, a pair of genitals, 3 pairs of ventral setae in the preanal region, and the usual 3 anal setae. The metasternal setae are situated on the integument beside the shield.

Integument of idiosoma bears 41 pairs of setae, those near the posterior margin and on the dorsum being relatively stout and spine-like. The peritremes extend to the middle of coxa II. Endopodal shields are present between coxae III and IV and an indistinct, oval, metapodal shield is visible on one side.

Chaetotaxy of the legs as in the female ; anterior seta of coxa III with a projection near its base. Length of tibia I, 60μ ; tarsus I, 99μ ; tibia IV, 57μ ; tarsus IV, 102μ.

Immature stages. Not known.

Hosts and Localities. *Nycteris* spec., Birnim Kebbi, Nigeria (presented by Dr. F. Radovsky). *Pipistrellus nanus* (Peters), Elisabethville, Kipopo, Congo, collected by M. Lips, 1st December, 1955 (sent by Dr. P. L. G. Benoit). *Scotophilus nigrita* (Schreber), Jadotville, Congo, collected by R. P. F. Anciaux de Faveaux, 1st December, 1957 (sent by Dr. P. L. G. Benoit).

Steatonyssus (Steatonyssus) calcaratus Radovsky & Yunker

Steatonyssus calcaratus Radovsky & Yunker 1963, J. Parasit. **49** : 337, figs. 17–27.

FEMALE. Deutosternal teeth not clearly visible in the specimen examined. Basal segment of chelicera 24μ, second segment 80μ, chelae about 36μ long.

Podonotal shield 246μ long, 186μ wide between setae *z*3, bearing eleven pairs of setae. Seta *i*2 very small, approximately half as long as *i*3 and one-third the distance between *i*4 and *z*2. Seta *i*3 about half as long as *z*1, and seta *i*5 nearly as long as seta *z*3. Opisthonotal shield 234μ long, 138μ wide at the level of seta *J*1. It bears 8 pairs of setae and an additional unpaired seta on one side. Setae *J*1 are the longest (24μ) and the 3 posterior pairs are the shortest (12–15μ) ; the subterminal setae are absent. Both dorsal shields have a reticulate pattern.

Sternal shield not very clearly demarcated from the reticulate presternal area ; posterior portion of shield very slightly darker than the anterior portion, with a more compressed reticulate pattern. Length of shield 45μ, width between second pair of setae 108μ. Sternal and metasternal setae subequal in length. Genital shield about 125μ long from level of genital setae, 50μ wide between the setae ; length of setae approximately equal to the distance between their bases. The shield has a slender antero-median process which extends over the sternal shield. Anal shield pear-shaped, 81μ long to base of postanal seta, 60μ wide through middle of anus. Paranal setae level with posterior fourth of anus.

Integument of idiosoma bears about 84 pairs of setae. Ventral setae about 40μ long, slightly inflated basally, tapering to fine points ; dorsal setae shorter and stouter, those near the posterior margin having a maximum length of about 30μ. Peritremes extend beyond middle of coxa II ; peritrematal shields extend to anterior part of coxa I. Endopodal shields are present between coxae III and IV, and a pair of small, very weakly sclerotized metapodal shields is present behind coxae IV.

Chaetotaxy of the legs follows the typical *Steatonyssus* pattern. Coxa III has a pronounced spur which bears the posterior seta near its tip. Length of tibia I, 66μ ; tarsus I, 120μ ; tibia IV, 72μ ; tarsus IV, 140μ ; basal width of tarsus IV, 36μ.

MALE. Unknown.

PROTONYMPH. Podonotal shield 156μ long, 102μ wide between setae *z*3, bearing eleven pairs of setae. Pygidial shield about 48μ long, 66μ wide, bearing 3 pairs of setae. The first pair is relatively short, being half as long as the second and three-fifths as long as the third pair. Two pairs of mesonotal scutellae are present at the level of setae *J*1–*J*2. Anal shield 35μ long to base of postanal seta, 42μ wide through middle of anus.

Chaetotaxy of legs normal. Posterior seta of coxa III arises from a small protuberance. Anterior dorsal setae on femur IV stouter than the other leg setae.

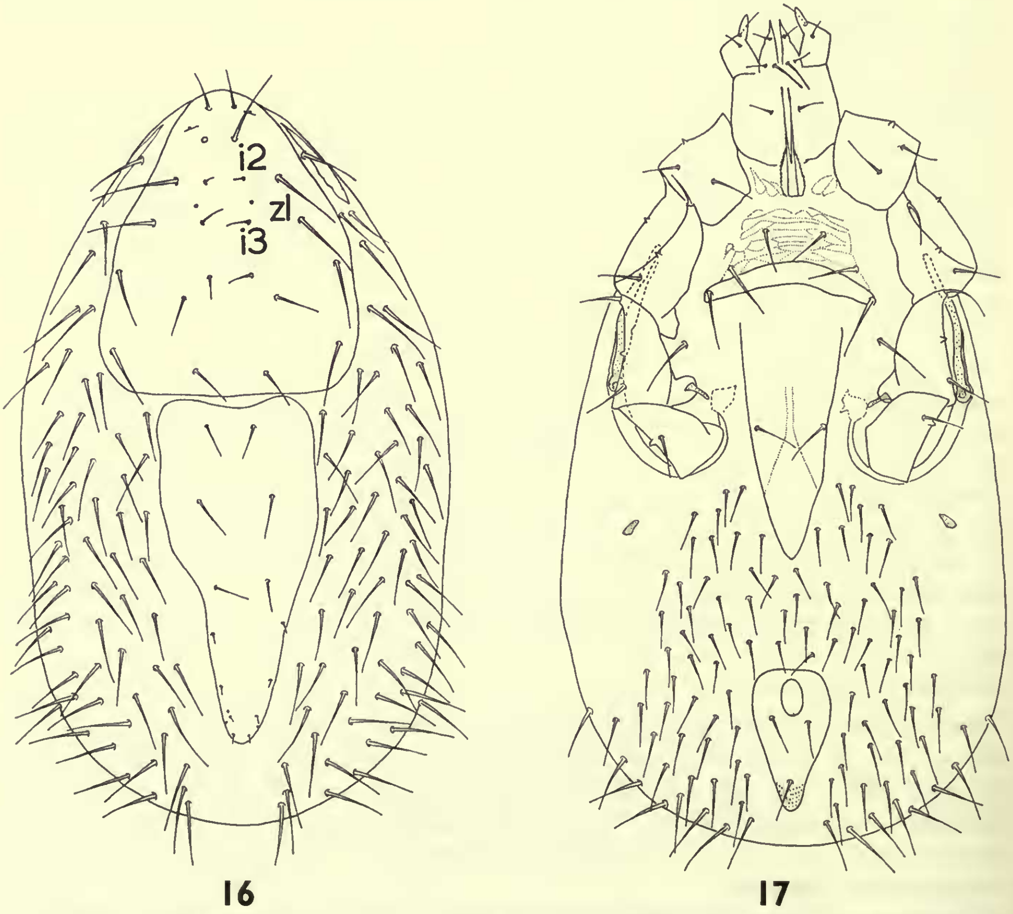
Length of tibia I, 36μ ; tarsus I, 70μ ; tibia IV, 33μ ; tarsus IV, 78μ ; basal width of tarsus IV, 24μ.

HOSTS AND LOCALITIES. *Coleura afra* (Peters), Ngombeni, Kiwali, Kenya, collected by C. E. Yunker, 17th July, 1956 (♀ paratype presented by Dr. F. Radovsky). *Triaenops afer* Peters, Tanga, Sigi River, Tanganyika, collected by C. E. Yunker, 2nd August, 1956 (protonymphal paratype presented by Dr. F. Radovsky).

Steatonyssus (Steatonyssus) ceratognathus (Ewing)

Ceratonyssus ceratognathus Ewing 1923, Proc. U.S. nat. Mus. **62** (2459) : 11–12, pl. 1, fig. 3.
Steatonyssus ceratognathus, Fonseca 1948, Proc. zool. Soc. Lond. **118** : 316 ; Radovsky & Furman 1963, Ann. ent. Soc. Amer. **56** : 274, figs. 13, 17, 23c, 24d.

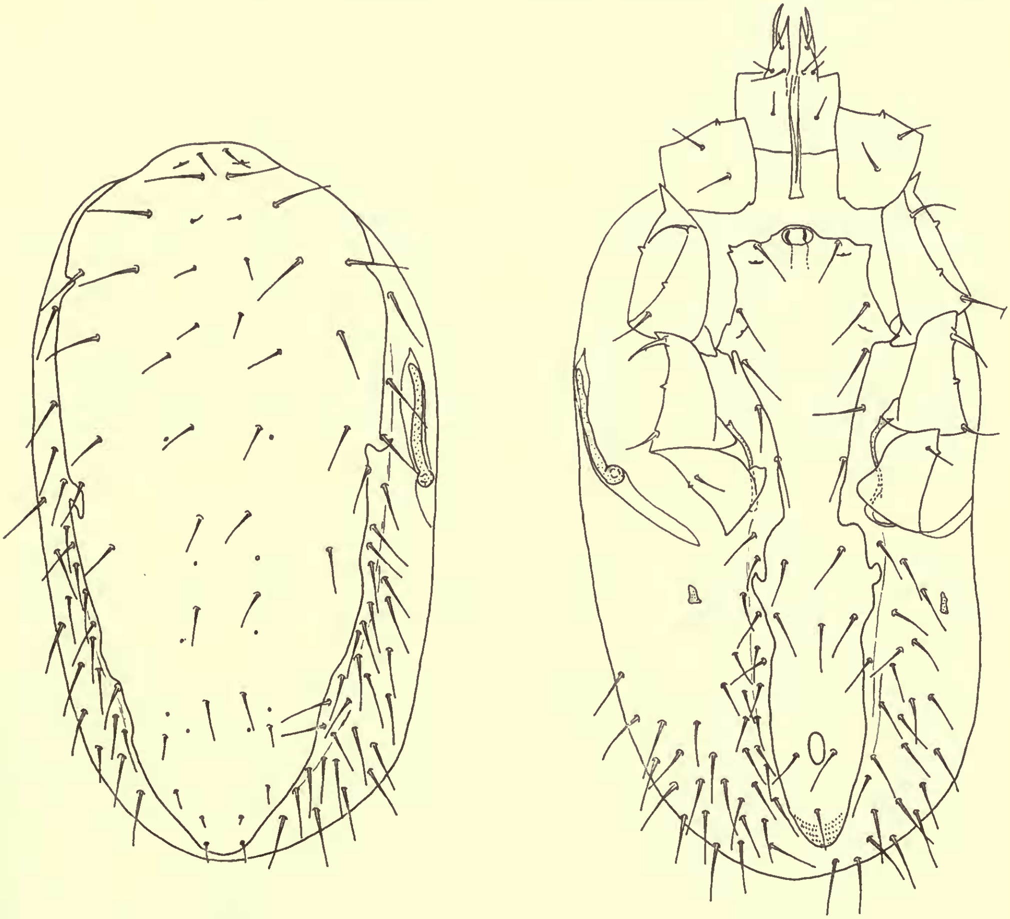
FEMALE (Text-figs. 16–17). The deutosternal teeth are not clearly visible in the specimens examined. Basal segment of chelicera is 30μ, second segment 100μ and chela 40μ long.



FIGS. 16–17. *Steatonyssus* (*Steatonyssus*) *ceratognathus* (Ewing). Dorsum (fig. 16) and venter (fig. 17) of female.

Podonotal shield 265–274μ long, 214μ wide between setae *z*3, bearing eleven pairs of setae. The setae of the *i* series are relatively short, especially *i*2, which are less than one-third the length of *i*3 ; seta *i*3 is less than one-third as long as *z*1 and seta *i*5 is half as long as seta *z*3. Opisthonotal shield 246–296μ long, 140–164μ wide at the level of setae *J*1, bearing 7 pairs of setae. The length of seta *J*2 is less than half the distance between *J*2 and *J*3, and the 4 posterior pairs of setae are very minute. Both shields have a weakly defined reticulate pattern.

Sternal shield reticulate, posterior portion heavily sclerotized, slightly concave, sternal seta I slightly shorter than seta II. Length of shield 56–63μ, width between second pair of setae 104–120μ. Genital shield 113–126μ long from level of genital setae, 56–63μ wide between the setae ; length of setae about two-thirds the distance between their bases. Anal shield 78–101μ long to base of postanal seta, 66–73μ



Figs. 18–19. *Steatonyssus* (*Steatonyssus*) *ceratognathus* (Ewing). Dorsum (fig. 18) and venter (fig. 19) of male.

wide through middle of anus. Anus situated very near anterior margin of shield ; paranal setae near posterior margin of anus, slightly more slender than postanal seta but about the same length.

Integument of idiosoma bears numerous setae. Those on the ventral surface are slender and about as long as the genital setae ; the marginal and dorsal setae are about one and a half times as long and stout as the ventral setae, and have a maximum length of 60μ. Peritremes extend to middle of coxa II and are completely separated from the anterior part of the peritrematal shield. A pair of endopodal shields is situated between coxae III and IV, and a pair of roughly elliptical metapodal shields behind coxae IV.

The chaetotaxy of the legs follows the typical *Steatonyssus* pattern. Length of tibia I, 68–82μ ; tarsus I, 136μ ; tibia IV, 74–82μ ; and tarsus IV, 130–158μ ; basal width of tarsus IV, 45μ.

MALE (Text-figs. 18–19). Deutosternal teeth indistinct ; basal segment of chelicera 22μ, second segment 63μ, spermadactyl 42μ long, Dorsal shield 478μ long, 170μ wide between setae *z*3, bearing 20 pairs of setae. Holoventral shield narrow, bearing 17 setae, sternal seta IV being off the shield on one side. Chaetotaxy of integument similar to that of female ; peritremes reach anterior margin of coxa III.

Chaetotaxy of the legs similar to that of the female. Anterior seta on coxa III inflated basally. Length of tibia I, 60μ ; tarsus I, 99μ ; tibia IV, 57μ ; tarsus IV, 105μ.

PROTONYMPH. Described by Radovsky & Furman (p. 274, figs. 17, 23c).

HOSTS AND LOCALITIES. " Bat ", Butesburg, U.S.A., 30th May, 1914 (♀ cotype received on loan from U.S. National Museum). *Nycticeius humeralis* (Rafinesque), Columbia, South Carolina, U.S.A., 15th August, 1960 (1 ♂, 1 ♀ lent by Dr. F. Radovsky).

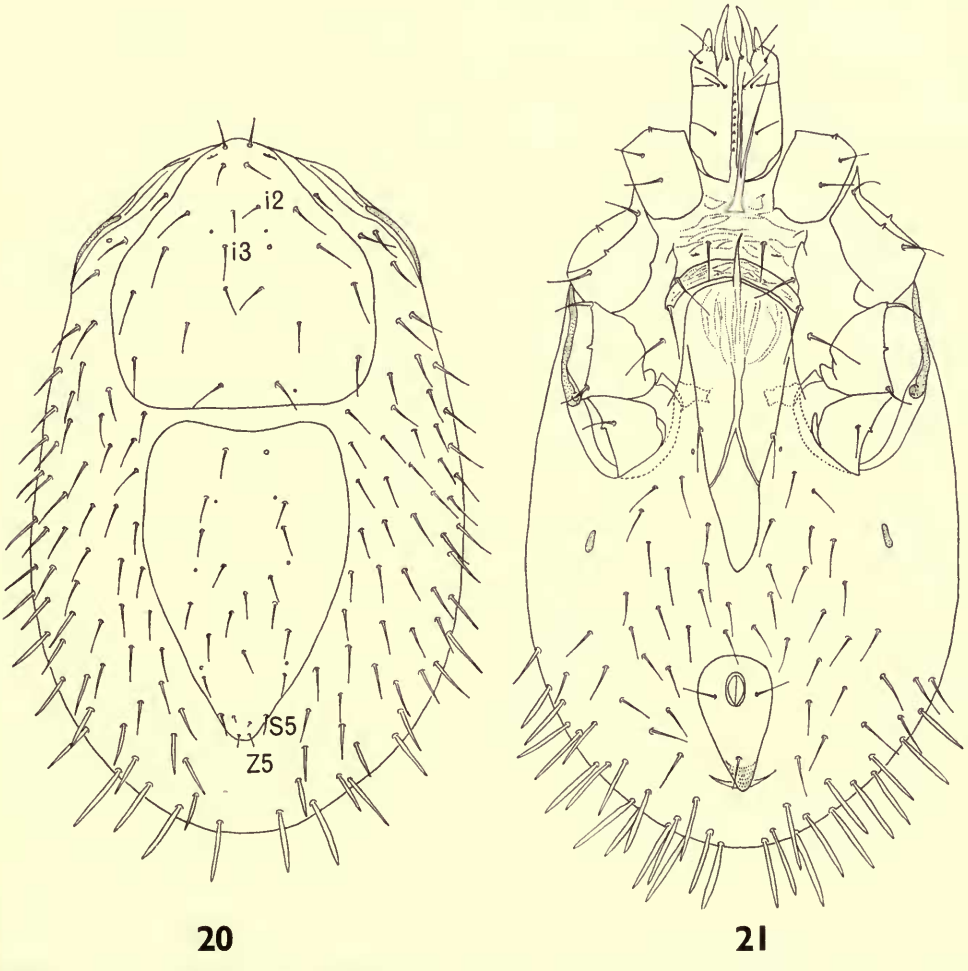
Steatonyssus (Steatonyssus) crassisetosus sp. nov.

FEMALE (Text-figs. 20–21). Deutosternum provided with 8 teeth arranged in a single file. Basal segment of chelicera 27–30μ long, second segment 108–114μ, chelae about 40μ long.

Podonotal shield 246–252μ long, 210–216μ wide between setae *z*3, bearing eleven pairs of setae (seta *i*3 is missing on one side in the holotype). Length of seta *i*2 is less than half the distance between *i*4 and *z*2, and about three-quarters the length of seta *i*3 ; setae *i*3 and *i*5 are three-quarters the lengths of *z*1 and *z*3 respectively. Opisthonotal shield 234–288μ long, 165–180μ wide at the level of setae *J*1, bearing 23 setae. The terminal setae (*Z*5) are slightly shorter than the postero-lateral setae on the shield. Both dorsal shields are reticulate.

Anterior part of sternal shield weakly reticulate, not sharply demarcated from the reticulate presternal area. Posterior portion strongly sclerotized, deeply concave. Length of shield 45–50μ (36–42μ from level of seta I), width between setae II is 105–108μ. Sternal setae I and II subequal in length and about two-thirds as long as setae III and IV. Genital shield bears a pair of strongly sclerotized converging lines and has a pointed antero-median process which extends over the sternal shield. Length of shield from level of genital setae is 130–138μ, distance between the setae is 63–75μ. Length of setae about three-fifths the distance between their bases. Anal shield pear-shaped. Length to base of postanal seta 93–102μ, 72μ wide through middle of anus. Paranal setae on a level slightly behind middle of anus, approximately the same length as the postanal seta.

Integument of idiosoma bears about 103 pairs of setae. The ventral setae are fine and slender, the marginal ones broad and rod-like, tapering only at the extreme tips, and the dorsal ones are rather stiff and spine-like. The postero-dorsal rod-like setae have a maximum length of 75μ. Peritremes long, curving onto the dorsum and terminating over the anterior part of coxa II ; the peritrematal shields continue to the anterior fourth of coxa I. Endopodal shields present between coxae III



FIGS. 20–21. *Steatonyssus* (*Steatonyssus*) *crassisetosus* sp. nov. Dorsum (fig. 20) and venter (fig. 21) of female.

and IV and a pair of roughly oval metapodal shields is present behind coxae IV.

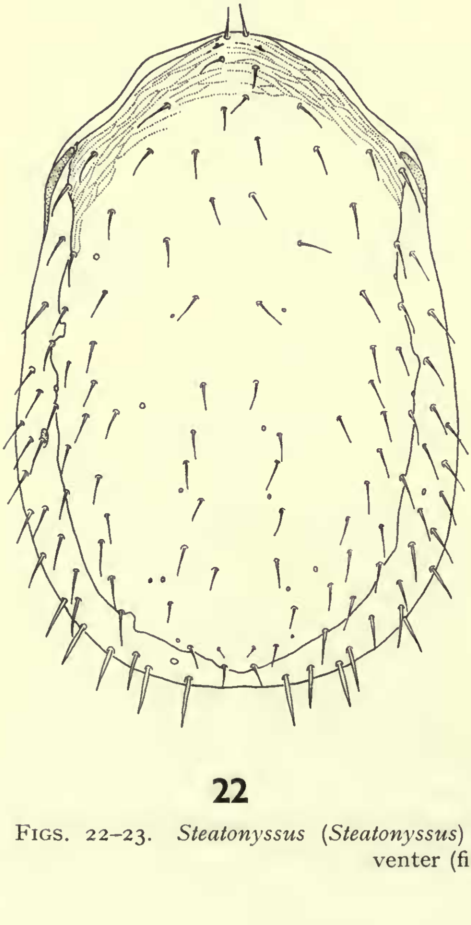
Chaetotaxy of the legs follows the typical *Steatonyssus* pattern. Length of tibia I, 90μ ; tarsus I, 160μ ; tibia IV, 84μ, and tarsus IV, 165–170μ ; basal width of tarsus IV, 40μ.

MALE (Text-figs. 22–23). Deutosternum bears 8 teeth. Basal segment of chelicera 24μ, second segment 66μ, chela with spermadactyl 40μ long.

Dorsal shield entire and covers almost the whole dorsum. Its length is 438–474μ; its width between setae *z*3 is 174–180μ. The shield incorporates many more setae than in the female, but the number is variable in different specimens and even on different sides of the same specimen. The number of setae on the anterior part of the shield (15 pairs) appears to be constant, whereas on the posterior part the number on each side may vary between 23 and 28 setae.

The holoventral shield has irregular lateral margins. It bears 3 pairs of setae in the sternal region, the metasternals being on the adjacent integument, one pair of genitals, 8–13 setae in the preanal region, and the usual 3 anal setae.

The setae on the unsclerotized integument are similar in form to those of the female. Peritremes extend to middle of coxa II ; endo- and metapodal shields



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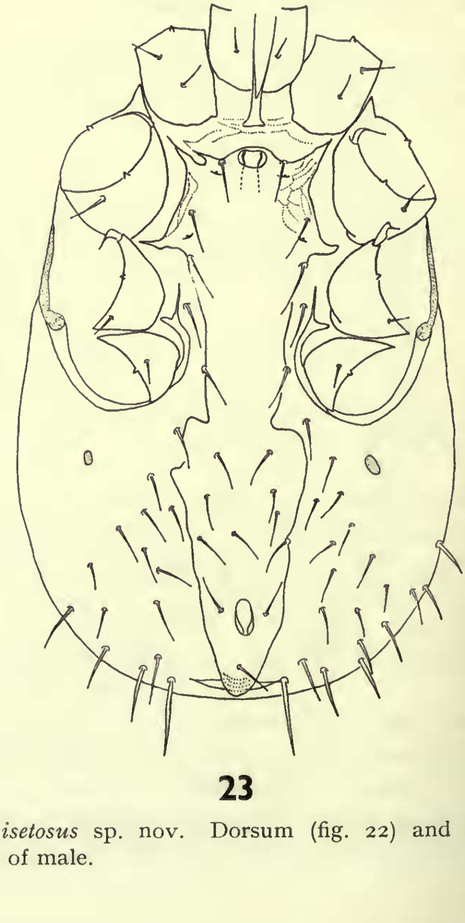


23

FIGS. 22–23. *Steatonyssus* (*Steatonyssus*) *crassisetosus* sp. nov. Dorsum (fig. 22) and venter (fig. 23) of male.

as in the female. Chaetotaxy of the legs as in the female. Anterior seta on coxa II inflated basally and terminating in a lateral point. Length of tibia I, 70μ ; tarsus I, 123–126μ ; tibia IV, 65–70μ ; tarsus IV, 110–126μ.

PROTONYMPH. Not known.

HOSTS AND LOCALITIES. *Tadarida spillmanni* Monard, Kinke, Elisabethville, Congo, collected by Messrs. Anciaux and Lips, 23rd December, 1955 (material sent by Dr. V. Aellen). Holotype (1963.11.11.39), allotype (1963.11.11.44), two male (1963.11.11.42–43) and two female paratypes (1963.11.11.40–41) in the collection of the British Museum (Natural History) ; two male and four female paratypes presented to the Muséum d'Histoire naturelle, Geneva ; one male and one female paratype presented to the South African Institute for Medical Research, Johannesburg.

Steatonyssus (Steatonyssus) emarginatus Radovsky & Furman

Steatonyssus emarginatus Radovsky & Furman 1963, Ann. ent. Soc. Amer. **56** : 270, figs. 15, 22, 24c, 25.

FEMALE. Deutosternum has 7 teeth arranged in a single file. Basal segment of chelicera 21μ, second segment 90μ, chelae 27μ long.

Podonotal shield 243μ long, 198μ wide between setae *z*3, bearing 12 pairs of setae. In one of the specimens examined a 13th seta appears to be situated on the extreme margin on one side of the shield. Setae *i*2 are extremely minute, about one-fifth the length of *i*3 ; seta *i*3 is about two-thirds as long as *z*1 and seta *i*5 is nearly as long as *z*3. Opisthonotal shield 294μ long, 130μ wide at the level of setae *J*1. It bears 7 pairs of setae. The three anterior pairs are relatively long (about 45μ) ; length of seta *J*2 about half the distance between *J*2 and *J*3. The posterior setae are short and fine (12–18μ) ; the terminal pair is the longest and the subterminal pair is extremely minute. Both shields are reticulate, except the posterior tip of the opisthonotal shield, which bears longitudinal striations.

Sternal shield 50μ long, 110μ wide between setae II. Anterior part of shield reticulate ; posterior part thickened, with a finely granular appearance and a few reticulations. Sternal seta I about seven-eighths as long as seta II. Genital shield 120μ long from the level of the genital setae, 78μ wide between the setae ; length of genital setae slightly more than half the distance between their bases. Anal shield 94μ long to base of postanal seta, 70μ wide through middle of anus. Paranal setae situated near posterior margin of anus, slightly shorter than the postanal seta.

Integument of idiosoma bears numerous setae ; the ventral ones are slender and hair-like, becoming stouter towards the posterior margin ; the dorsal setae are a little longer and thicker than the ventral ones, those near the posterior margin having a maximum length of 50μ. Peritreme does not reach anterior margin of coxa III. The separated, leaf-like, anterior portion of the peritrematal shield lies over the anterior half of coxa II and the posterior half of coxa I. A pair of indistinct metapodal shields is situated behind coxae IV.

Chaetotaxy of the legs typical for the genus. Coxa II has a long, pointed, anterodorsal spine. Length of tibia I, 75μ ; tarsus I, 123μ ; tibia IV, 75μ ; tarsus IV, 135μ ; width of tarsus IV, at the base, 39μ.

Male and Protonymph. Described by Radovsky & Furman (p. 272).

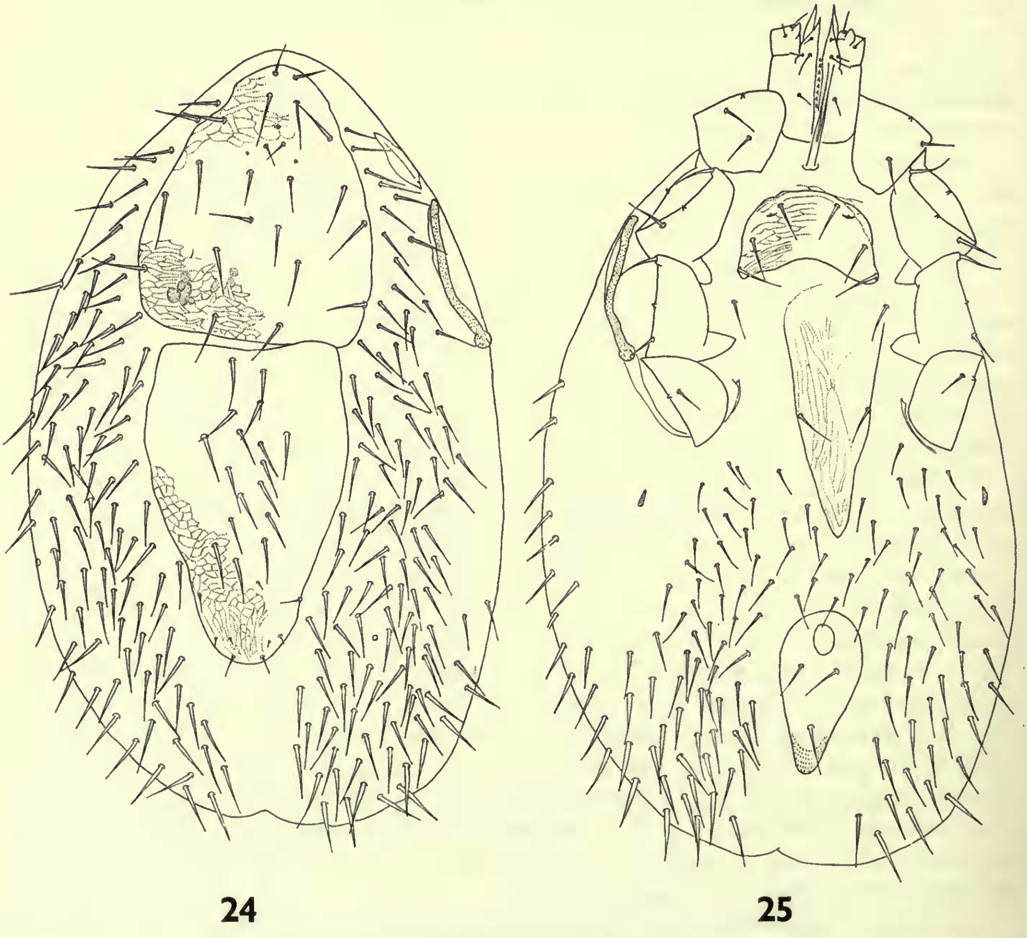
Hosts and Localities. *Pipistrellus hesperus* (H. Allen), Sabins Canyon, Santa Catalina Mountains, Arizona, U.S.A. (2 ♀♀, presented by Dr. F. Radovsky).

Radovsky & Furman (1963) list this species from the same host in California, and also from the following hosts and localities : *Myotis yumanensis* (H. Allen), Justiceburg, Garza Co., Texas. *Myotis* spec., Madera Co., California, U.S.A.

Steatonyssus (Steatonyssus) eos Zumpt & Till

Steatonyssus eos Zumpt & Till 1954, J. ent. Soc. S. Afr. **17** : 55, figs. 3–4.

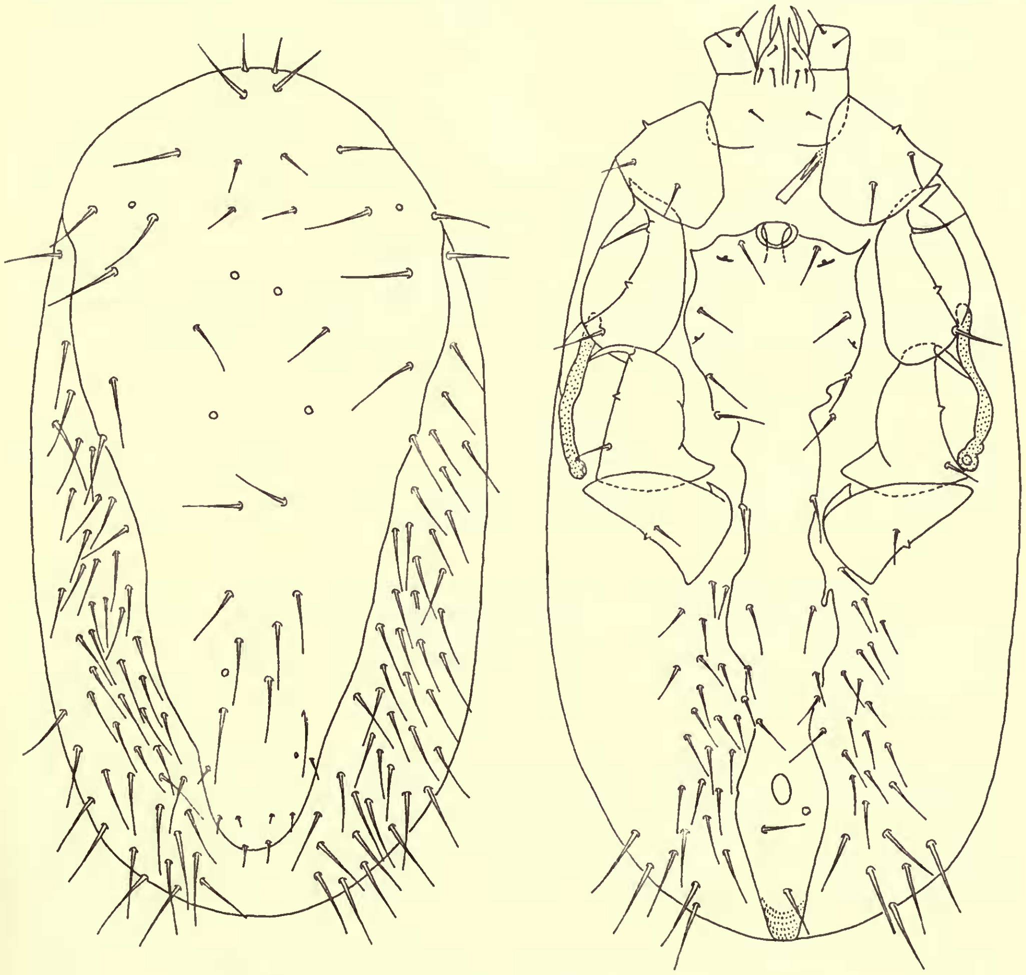
Female (Text-figs. 24–25). Deutosternum with 8 teeth arranged in a single file. First cheliceral segment 24μ, second segment 80μ, chelae 40μ long.



Figs. 24–25. *Steatonyssus (Steatonyssus) eos* Zumpt & Till. Dorsum (fig. 24) and venter (fig. 25) of female.

Podonotal shield 315–318μ long, 240–242μ wide between setae *z*3, bearing eleven pairs of setae. Length of seta *i*2 about three-fifths the length of *i*3, and less than half the distance between *i*4 and *z*2 ; seta *i*3 about two-thirds as long as *z*1 ; setae *i*5 and *z*3 subequal. Opisthonotal shield 354–357μ long, 204–210μ wide at the level of setae *J*1. It bears 23–26 setae, not all symmetrically placed. The anterior ones are relatively long and stout ; the four pairs of posterior setae, and in one specimen an additional unpaired seta, being relatively short and fine. The subterminals are minute. Both shields are strongly reticulate.

Sternal shield convex anteriorly, concave posteriorly, faintly granular in appearance and with a reticulate pattern which is more compressed on the posterior part


26 **27**

FIGS. 26–27. *Steatonyssus* (*Steatonyssus*) *eos* Zumpt & Till. Dorsum (fig. 26) and venter (fig. 27) of male.

of the shield. Length of shield 66–72µ, width between second pair of setae 132–138µ. Sternal and metasternal setae subequal in length. Genital shield with linear markings, 138–144µ long from level of genital setae, 78µ wide between the setae ; length of setae little more than half the distance between their bases. Anal shield an elongate pear shape, 132–156µ long to base of postanal seta, 90µ wide through middle of anus. Paranal setae situated posterior to the anus, slightly shorter and more slender than the postanal seta.

Integument of idiosoma bears numerous setae, the medially placed ventral ones being relatively short and slender, the marginal and dorsal ones being longer and stouter, with a maximum length of 66µ. Peritremes extend to the middle of coxa II and are widely separated from the anterior part of the peritrematal shield. Endo- and metapodal shields are not clearly visible in these specimens.

Chaetotaxy of the legs typical for the genus. Length of tibia I, 80µ ; tarsus I, 126µ ; tibia IV, 90µ ; tarsus IV, 165µ ; basal width of tarsus IV, 42µ.

MALE (Text-figs. 26–27). Deutosternum with 7 teeth. Basal segment of chelicera 30µ, second segment 70µ, chela with spermadactyl 45µ long. Dorsal shield strongly reticulated, 582µ long, 228µ between setae *z*3. The shield bears 21 pairs of setae, the 4 posterior pairs being very short and fine.

Holoventral shield very narrow, reticulate, with irregular margins. Metasternal setae present, one being off the shield. Integument of idiosoma with numerous setae of a similar form to those in the female. Peritremes extend almost to middle of coxa II.

Chaetotaxy of legs as in the female ; coxa III has a stout spine-like, anterior seta. Length of tibia I, 72µ ; tarsus I, 110µ ; tibia IV, 80µ ; tarsus IV, 135µ.

HOSTS AND LOCALITIES. *Pipistrellus nanus* (Peters) from Muhoroni, Kenya, 22nd December, 1952 [paratypes in the British Museum (Natural History)].

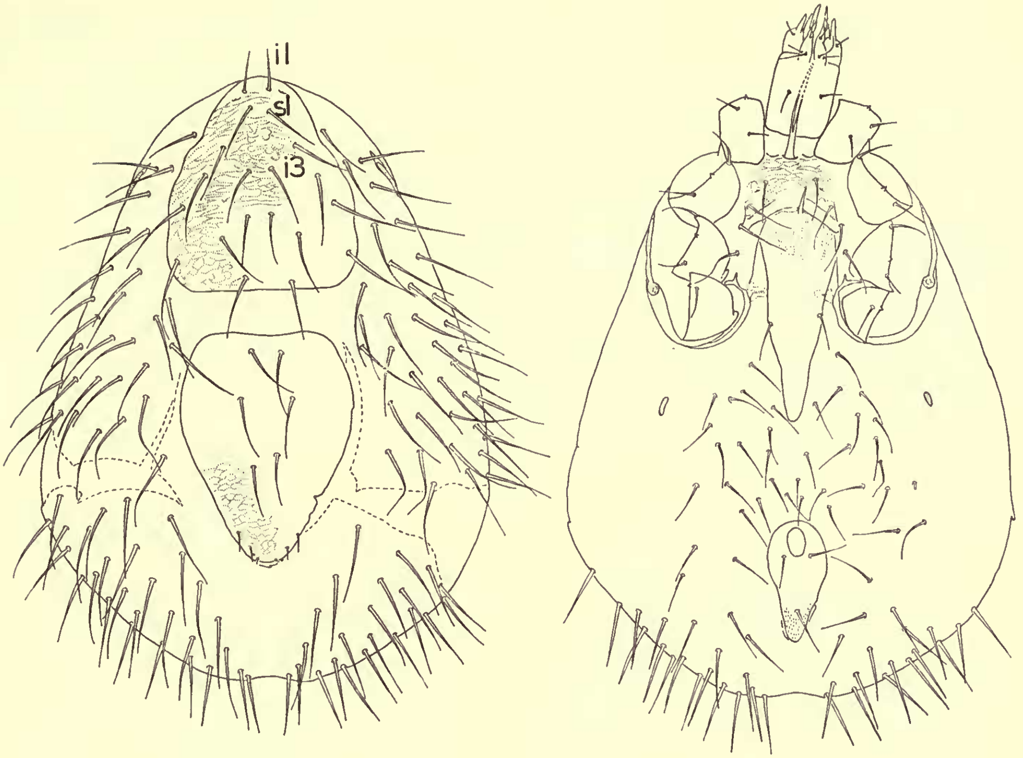
Steatonyssus (Steatonyssus) evansi Delfinado

Steatonyssus evansi Delfinado 1960, Fieldiana, Zoology **42** : 107, figs. 38 A, B.
Steatonyssus primus Grokhovskaya & Nguen-Huan-Hoe 1961, Zool. Zh. Moscow **40** : 1,565 & 1,641 (syn. nov.).

FEMALE (Text-figs. 28–29). Deutosternal teeth not clearly visible. Chela 50µ long, basal cheliceral segment 36–42µ, second segment 130–148µ long.

Podonotal shield 270–337µ long, 252–277µ between setae *z*3, bearing 10 pairs of setae. Setae *i*2 missing ; seta *i*3 nearly as long as *z*1 ; seta *i*5 about three-quarters as long as *z*3. Opisthonotal shield 306–365µ long, 222–227µ wide at the level of setae *J*1, bearing 6 pairs of setae. Setae *J*1–*J*3 are relatively long, the length of *J*2 being approximately equal to the distance between *J*2 and *J*3. The 3 posterior pairs are less than one-third the length of *J*2 ; setae *Z*5 are extremely small. Both shields have a well marked reticulate pattern.

Sternal shield about 50µ long (from level of seta I), 114–126µ wide between second pair of setae. The posterior portion is slightly thickened in appearance but does



28 **29**

FIGS. 28–29. *Steatonyssus* (*Steatonyssus*) *evansi* Delfinado. Dorsum (fig. 28) and venter (fig. 29) of female.

not form a heavily chitinized band. Sternal setae I and II subequal in length. Genital shield 144–158μ long from level of genital setae, 72–82μ wide between the setae ; length of setae about half the distance between their bases. Anal shield pear-shaped, 114–145μ long to base of postanal seta, 87–88μ wide through middle of anus. Paranal setae near posterior margin of anus, slightly shorter than postanal setae.

Integument of idiosoma bears numerous setae. There are about 20 pairs of slender ventral setae. Near the posterior margin the setae are broad, blade-like, tapering at the extreme tips. On the dorsum the setae are longer, coarser, and taper gradually. Peritremes do not quite reach middle of coxa II. Endopodal shields are present between coxae III and IV ; the metapodal shields are oval and weakly sclerotized.

Chaetotaxy of the legs typical for the genus. Length of tibia I, 132–145μ ; tarsus I, 222–252μ ; tibia IV, 132–145μ ; tarsus IV, 240–265μ.

MALE. Described by Delfinado (p. 107).

PROTONYMPH. Unknown.

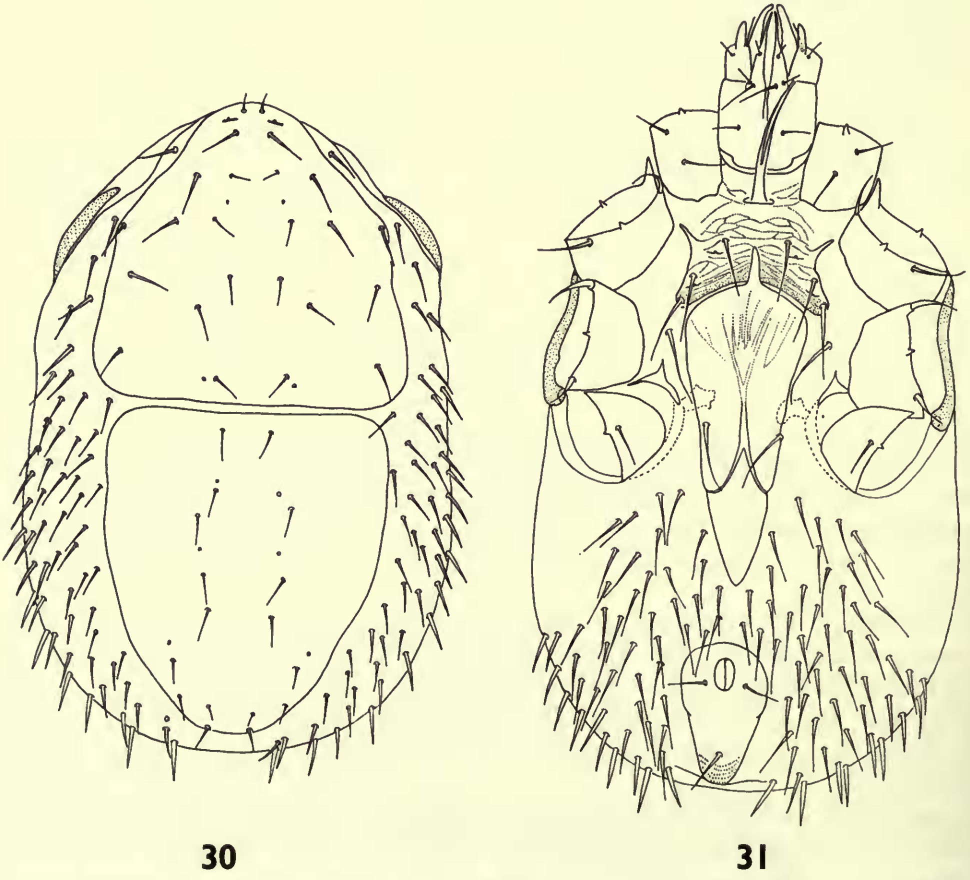
Hosts and Localities. *Scotophilus temminckii* (Horsfield), Mindanao, Philippines (♀ paratype lent by U.S. National Museum). " Bat ", Hanoi, N. Vietnam (♀ examined by courtesy of Dr. N. G. Bregetova). Grokhovskaya & Nguen-Huan-Hoe (1961) record the following hosts from N. Vietnam : *Cynopterus sphinx* (Vahl) ; *Scotophilus kuhli* Leach.

Steatonyssus (Steatonyssus) faini Delfinado

Steatonyssus faini Delfinado 1960, Fieldiana, Zoology **42** : 106, figs. 37 A, B.
Steatonyssus secundus Grokhovskaya & Nguen-Huan-Hoe 1961, Zool. Zh. Moscow **40** : 1,565 & 1,641 (syn. nov.).

Female (Text-figs. 30–31). Deutosternum with 6 teeth. Basal segment of chelicera 18μ, second segment 102μ, chela 33μ long.

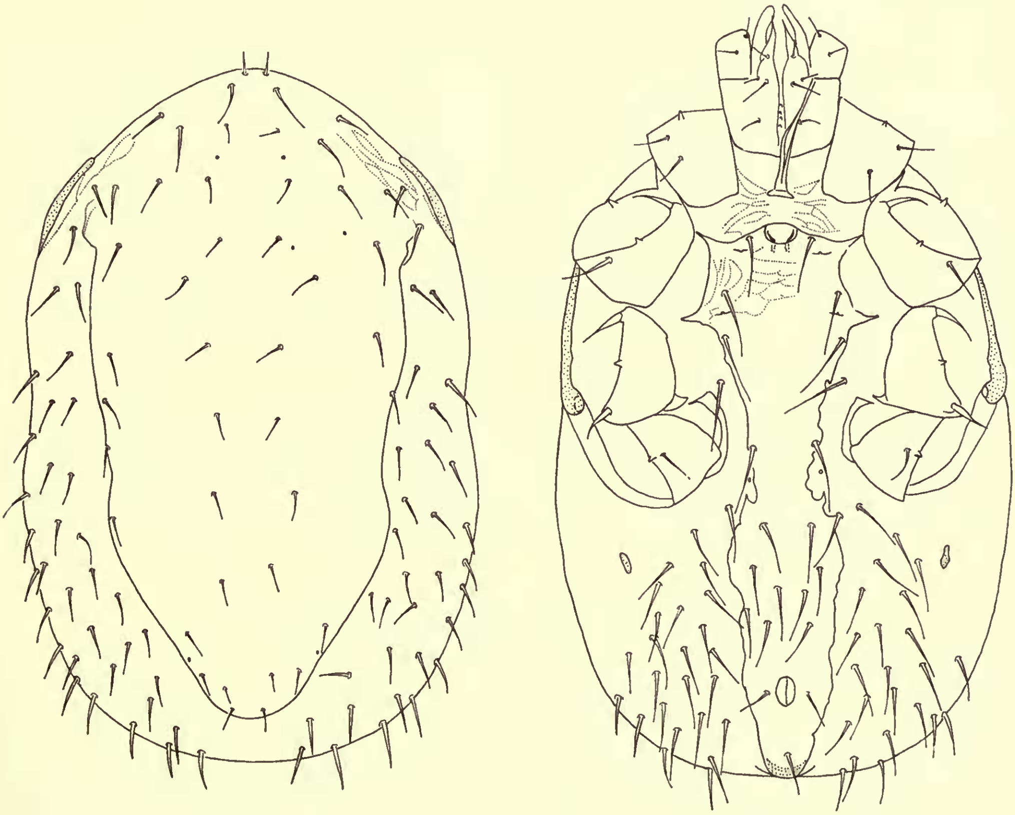
Podonotal shield 246–265μ long, 204–220μ between setae *z*3, bearing 12 pairs of setae. Seta *i*2 about three-quarters as long as *i*3 ; setae *i*3 and *i*5 about two-



Figs. 30–31. *Steatonyssus* (*Steatonyssus*) *faini* Delfinado. Dorsum (fig. 30) and venter (fig. 31) of female.

thirds the length of *z*1 and *z*3 respectively. Opisthonotal shield 258–265μ long, 222–235μ wide at the level of setae *J*1, bearing 15–17 setae. Both shields have a reticulate pattern.

Sternal shield 33μ long from level of setae I, 48μ from anterior margin of reticulate area, 96–99μ wide between setae II. Anterior part of shield not clearly demarcated from reticulate presternal area ; posterior portion has a faintly granular appearance and a more compressed reticulate pattern, but it is not heavily sclerotized. Genital shield 109–126μ long from level of genital setae, 55–57μ wide between the setae ; length of setae a little less than the distance between their bases. The shield is marked by a pair of thick, curved lines which converge posterior to the genital setae. Anal shield 84–90μ long to base of postanal seta, 62–70μ wide through middle of anus. Paranal setae near posterior margin of anus, slightly shorter than postanal seta.



32 **33**

FIGS. 32–33. *Steatonyssus* (*Steatonyssus*) *faini* Delfinado. Dorsum (fig. 32) and venter (fig. 33) of male.

Integument of idiosoma bears about 100 pairs of setae. The ventral ones are long and finely pointed ; those near the posterior margin are relatively stouter, and the dorsal ones are relatively shorter. Peritremes terminate over a point between the middle and anterior margin of coxa II ; peritrematal shield forms a leaf-like expansion which extends nearly to the anterior border of coxa I. A pair of endopodal shields is present between coxae III and IV, and a pair of weakly sclerotized, elongate, metapodal shields is situated behind coxae IV.

Chaetotaxy of the legs typical for the genus. Setae on coxa III stouter than those on the other coxae. Coxae II–IV have curved ridges ventrally. Length of tibia I, 57–58μ ; tarsus I, 94–96μ ; tibia IV, 60–62μ ; tarsus IV, 124–132μ.

MALE (Text-figs. 32–33). Basal segment of chelicera 15μ, second segment 63μ, chela and spermadactyl 40μ long. Dorsal shield 420μ long, 174μ wide between setae *z*3. It bears 22 pairs of setae and two additional marginal setae on one side. There is a reticulate pattern on the antero-lateral part of the shield, but only occasional faint markings can be seen on the remaining part of the shield (in the one specimen available).

Holoventral shield narrow, irregular in outline, with a reticulate pattern. The metasternal setae are situated on the integument beside the shield. The preanal region of the shield bears 4 pairs of setae plus 2 asymmetrically placed marginal ones. Integument of idiosoma bears about 54 pairs of dorsal and ventral setae which are similar in form to those of the female. Endopodal shields level with coxae IV ; metapodal shields as in female ; peritremes extend to anterior part of coxa II.

Chaetotaxy of legs as in female. Anterior seta on coxa II and both setae on coxa III relatively broad basally. Length of tibia I, 45μ ; tarsus I, 75μ ; tibia IV, 48μ ; tarsus IV, 84μ.

PROTONYMPH. Unknown.

HOSTS AND LOCALITIES. *Scotophilus temminckii* (Horsfield), Palawan, Cuyo Island, Philippines (♀ paratype lent by U.S. National Museum). " Bat ", Hanoi, N. Vietnam (♂ and ♀ examined by courtesy of Dr. N. G. Bregetova). Grokhovskaya & Nguen-Huan-Hoe (1961) record the following hosts from N. Vietnam : *Cynopterus sphinx* (Vahl) ; *Scotophilus kuhli* Leach.

Steatonyssus (Steatonyssus) hipposideros Till

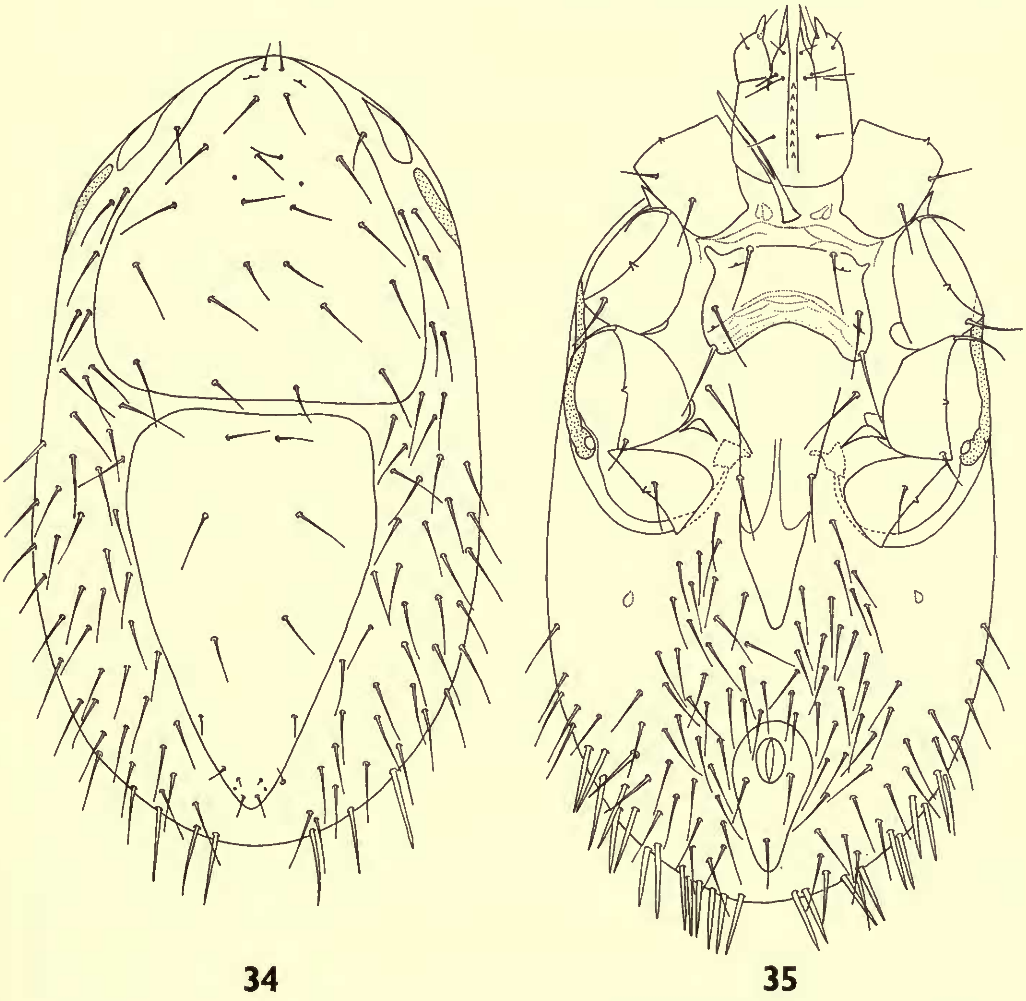
Steatonyssus hipposideros Till 1958, Rev. suisse Zool., **65** : 242, figs. 1–4.

FEMALE (Text-figs. 34–35). Deutosternum has 8 teeth. Basal segment of chelicera 24–30μ, second segment 96μ, chelae 36–40μ long.

Podonotal shield 276–280μ long, 198–204μ wide between setae *z*3, with eleven pairs of setae. Setae *i*2 about five-sixths the length of *i*3, slightly shorter than the distance between *i*4 and *z*2 ; seta *i*3 about two-thirds as long as *z*1 ; seta *i*5 about three-fifths as long as *z*3. Opisthonotal shield 288–318μ long, 183–192μ wide at level of setae *J*1, with 7 pairs of setae. Length of seta *J*2 a little more than half the distance between *J*2 and *J*3. The 4 posterior pairs of setae are relatively short and fine ; the terminals are slightly longer than the postero-laterals ; the subterminals are minute. Both shields have a reticulate pattern.

Sternal shield 60–66μ long, 108–120μ wide between setae II. Posterior part of shield has a slightly thickened and granular appearance and a more compressed reticulate pattern than the anterior part of the shield. Sternal seta I about three-quarters the length of seta II. Genital shield 126μ long, 54–60μ wide between the genital setae ; length of setae equal to the distance between their bases. Anal shield pear-shaped, 90–96μ long to base of postanal seta, 63–72μ wide through middle of anus. Paranal setae near posterior margin of anus, about the same length as the postanal seta.

Integument of idiosoma bears numerous setae, including about 40 pairs of hair-like ventral setae. The marginal setae are broad and blade-like, the postero-dorsal

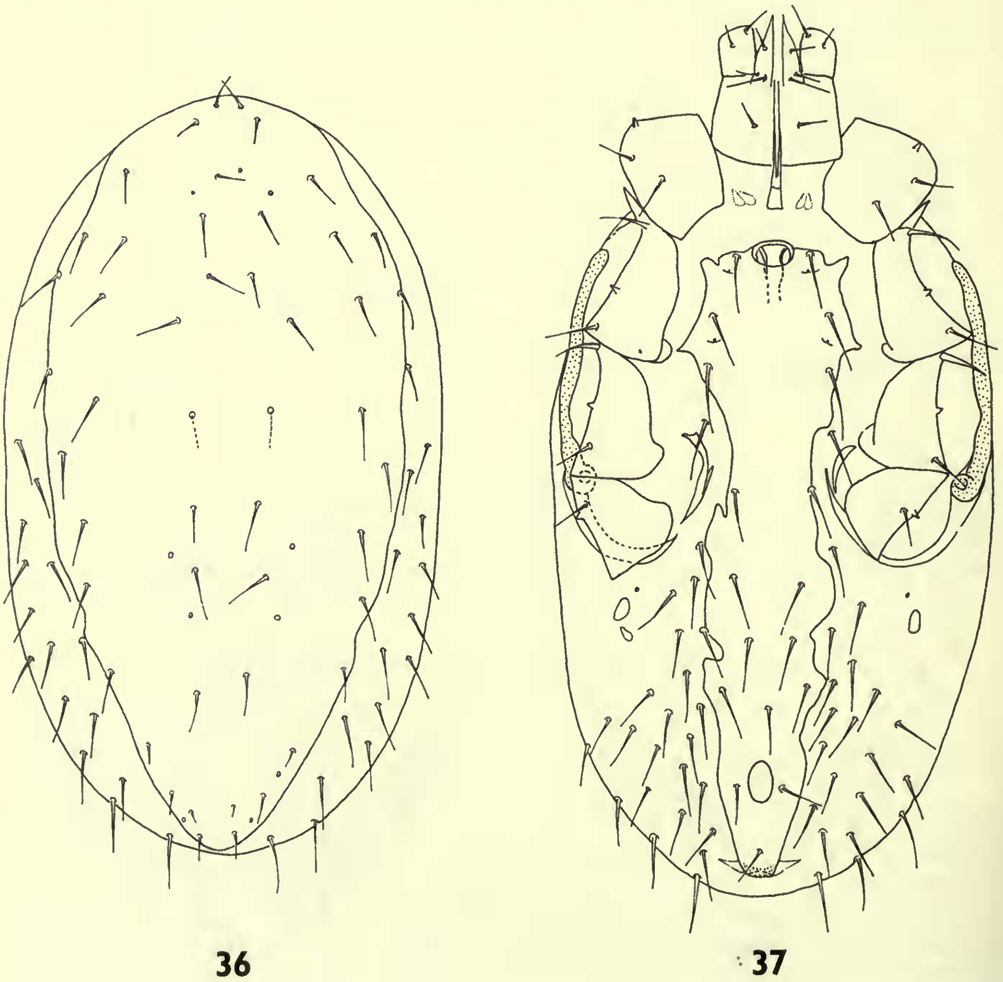


FIGS. 34–35. *Steatonyssus* (*Steatonyssus*) *hipposideros* Till. Dorsum (fig. 34) and venter (fig. 35) of female.

ones having a maximum length of about 66μ. Peritremes reach the anterior margin of coxa II ; the separated anterior part of the peritrematal shield lies over coxa I. Endopodal shields are present between coxae III and IV ; the metapodal shields are very weakly sclerotized and irregularly ovoid in shape.

Chaetotaxy of the legs typical for the genus. Length of tibia I, 90μ ; tarsus I, 150μ ; tibia IV, 90μ ; tarsus IV, 168–174μ ; basal width of tarsus IV, 42μ.

MALE (Text-figs. 36–37). Deutosternum with 8 teeth ; basal segment of chelicera 24μ, second segment 66μ, chela and spermadactyl 42μ long. Dorsal shield 474–480μ long, 165–174μ wide between setae *z*3, with an overall reticulate pattern and an irregular margin. It bears 26 pairs of setae.



FIGS. 36–37. *Steatonyssus* (*Steatonyssus*) *hipposideros* Till. Dorsum (fig. 36) and venter (fig. 37) of male.

Holoventral shield narrow, irregular in outline, with a granular and reticulate pattern. Metasternal setae situated on the integument beside the shield ; from 8–12 setae present in the preanal region of the shield. Setae on the integument of the idiosoma relatively slender, only the terminal pair being noticeably thickened. Peritremes as in the female ; metapodal shields present, variable in shape.

Chaetotaxy of the legs as in the female ; anterior setae on coxae II and III thickened. Length of tibia I, 70µ ; tarsus I, 110µ ; tibia IV, 70µ ; and tarsus IV, 126µ.

PROTONYMPH. Unknown.

HOSTS AND LOCALITIES. *Hipposideros cyclops* (Temminck) from Yapo, Ivory Coast, 14th August, 1953 (2 ♂ and 3 ♀ paratypes lent by Dr. F. Zumpt, South African Institute for Medical Research).

Steatonyssus (Steatonyssus) javensis javensis (Oudemans)

Liponyssus javensis Oudemans 1914, Ent. Ber. Amst. **4** (76) : 69, & 1915, Arch. Naturgesch. Abt. A., **81** (1) : 167, figs. 135–153.

Ceratonyssus javensis, Ewing 1922, Proc. U.S. nat. Mus. **62** : 6.

Steatonyssus javensis, Buitendijk 1945, Overdrukt Zool. Med. **24** : 307 ; Fonesca 1948, Proc. zool. Soc. Lond. **118** : 316.

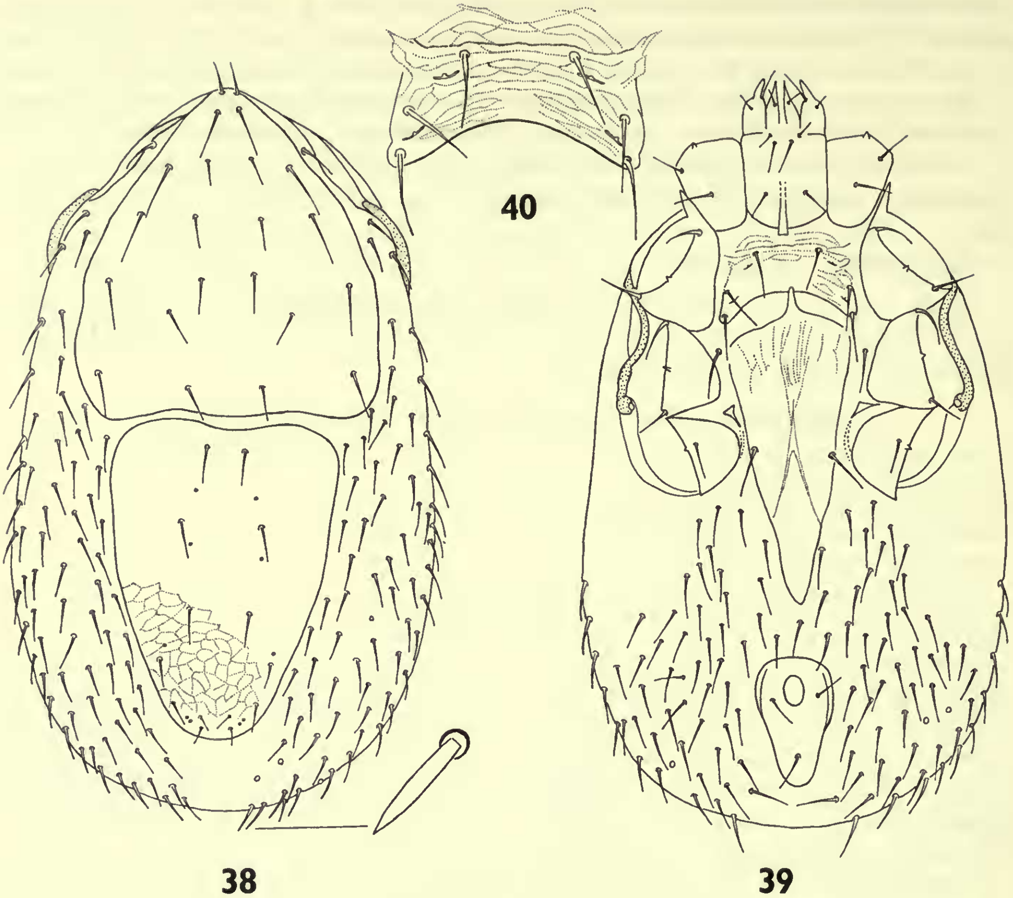
FEMALE (Text-figs. 38–40). Deutosternum with 7 teeth. Basal segment of chelicera 36µ, second segment 105µ, chelae about 30µ long.

Podonotal shield 210–220µ long, 170–177µ wide between setae *z*3, bearing eleven pairs of setae. Lengths of setae *i*2 and *i*3 subequal, three-fifths the distance between *i*4 and *z*2. Seta *i*3 two-thirds as long as *z*1 ; seta *i*5 about three-quarters the length of *z*3. Opisthonotal shield 208–223µ long, 140–156µ wide at the level of setae *J*1, with 7 pairs of setae. Length of seta *J*2 about one-third the distance between setae *J*2 and *J*3 ; terminal setae not longer than the postero-laterals ; subterminals three-quarters as long as the terminals.

Sternal shield concave posteriorly, without any posterior thickening, but with a more compressed reticulate pattern in that region. Length of shield 32–36µ, width between second pair of setae 80–90µ. Sternal and metasternal setae subequal in length. Genital shield 105–108µ long from level of genital setae, 54µ wide between the setae ; length of setae two-thirds the distance between their bases. Anal shield pear-shaped, 66–70µ long to base of postanal seta, 50–54µ wide through middle of anus. Paranal setae near posterior margin of anus, slightly shorter than postanal seta.

Integument of idiosoma bears numerous setae which tend to become shorter and stouter towards the posterior end of the body. The postero-dorsal setae have a maximum length of 27µ. Peritremes reach anterior fourth of coxa II ; peritrematal shields continue to the anterior fourth of coxa I. Endo- and metapodal shields are not clearly visible.

Chaetotaxy of the legs typical for the genus. Coxa II has a large antero-dorsal spine which, in certain positions, appears to have minute terminal denticulations. Length of tibia I, 45µ ; tarsus I, 66µ ; tibia IV, 42µ ; tarsus IV, 78µ ; basal width of tarsus IV, 27µ.

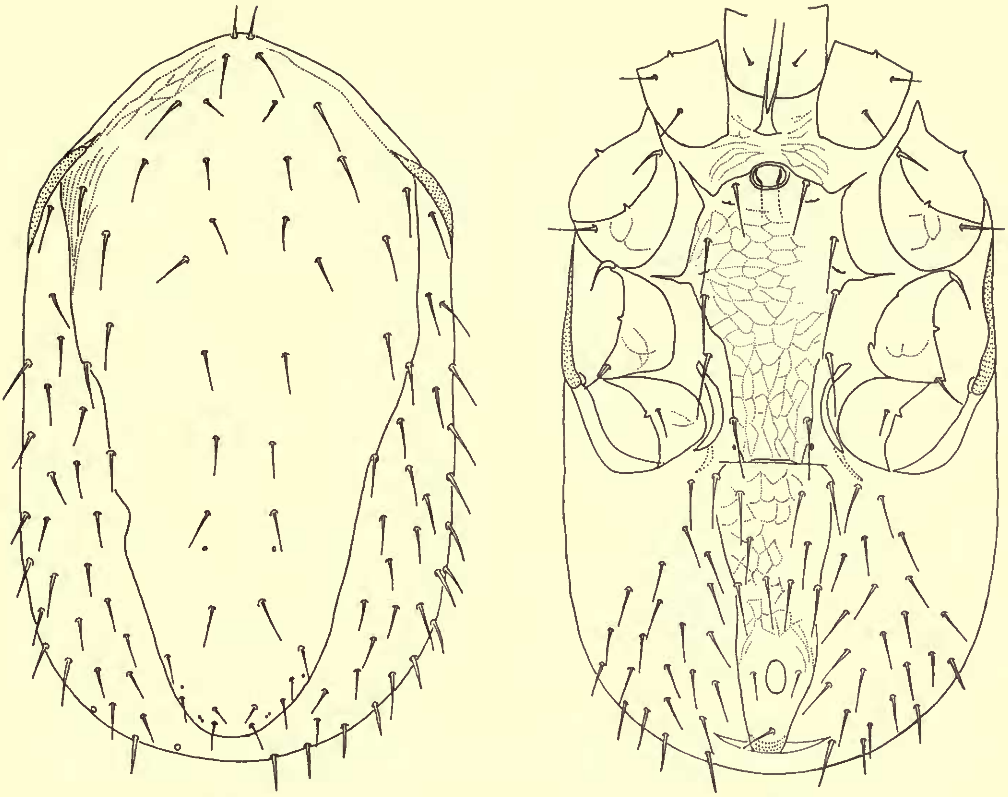


Figs. 38–40. *Steatonyssus* (*Steatonyssus*) *javensis javensis* (Oudemans). Dorsum with one enlarged seta (fig. 38); venter (fig. 39) and enlarged sternal shield (fig. 40) of female.

Male (Text-figs. 41–42). Deutosternum with 7 teeth. Basal cheliceral segment 15μ, second segment 60μ, chela and spermadactyl 30μ long. Dorsal shield 340–355μ long, 138–144μ wide between setae *z3*. It bears 20 pairs of setae, 12 on the anterior and 8 on the posterior part. The shield has a reticulate pattern anteriorly, but behind setae *z2* and *z3* it has a granular appearance.

The sternito-genital shield is separated from the ventri-anal by a suture. The former bears 4 pairs of setae, the metasternals being on the striated integument adjacent to the shield; the latter bears 5 pairs of setae in the preanal region and the usual 3 anal setae. Integument of idiosoma bears about 50 pairs of setae similar in form to those of the female. Peritremes extend to anterior part of coxa II.

Chaetotaxy of legs as in the female. Length of tibia I, 40μ; tarsus I, 54μ; tibia IV, 36μ; tarsus IV, 63μ.



FIGS. 41–42. *Steatonyssus* (*Steatonyssus*) *javensis javensis* (Oudemans). Dorsum (fig. 41) and venter (fig. 42) of male.

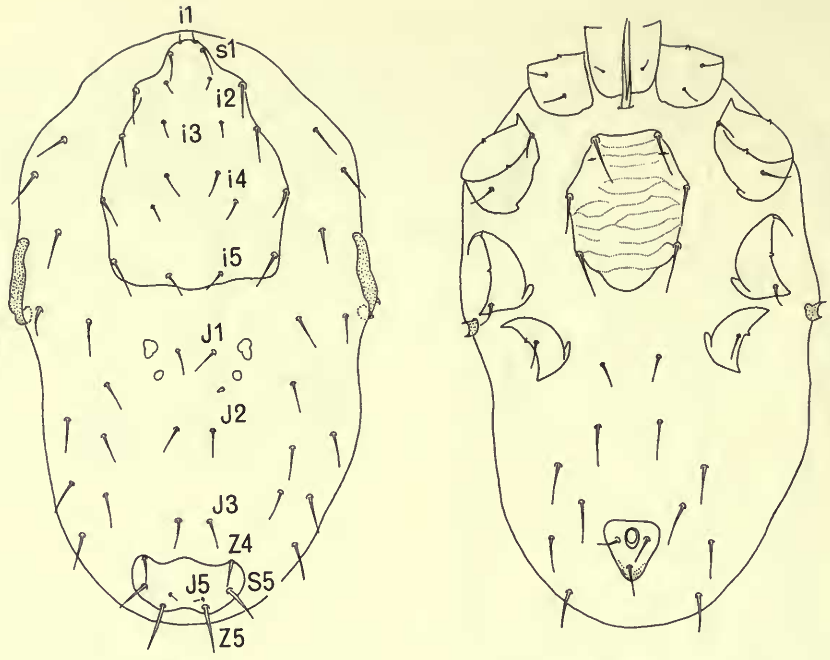
PROTONYMPH (Text-figs. 43–44). Podonotal shield 150μ long, 99μ between setae *z*3. Pygidial shield 33μ long, 66μ wide. It bears 4 pairs of setae, the anterior pair being half as long as the posterior pair ; the subterminal setae are minute. Anal shield 30μ long to base of postanal seta, 36μ wide through middle of anus.

Chaetotaxy of legs normal. Length of tibia I, 27μ ; tarsus I, 39μ ; tibia IV, 24μ ; tarsus IV, 45μ.

HOSTS AND LOCALITIES. " Chiropteron ", Khandala, Bombay, India, 1911 (males, females, protonymphs lent by Dr. L. van der Hammen, Rijksmuseum van Natuurlijke Historie, Leiden). *Pipistrellus babu* Thomas, Sanghu Village, Maewa Khola, Nepal, collected by K. H. Hyatt, 6th March, 1962.

Steatonyssus (Steatonyssus) javensis brevisetosus ssp. nov.

FEMALE (Text-figs. 45–47). Deutosternum bears 6 denticles. Basal segment of chelicera 15μ, second segment 114μ, chelae 33μ long.



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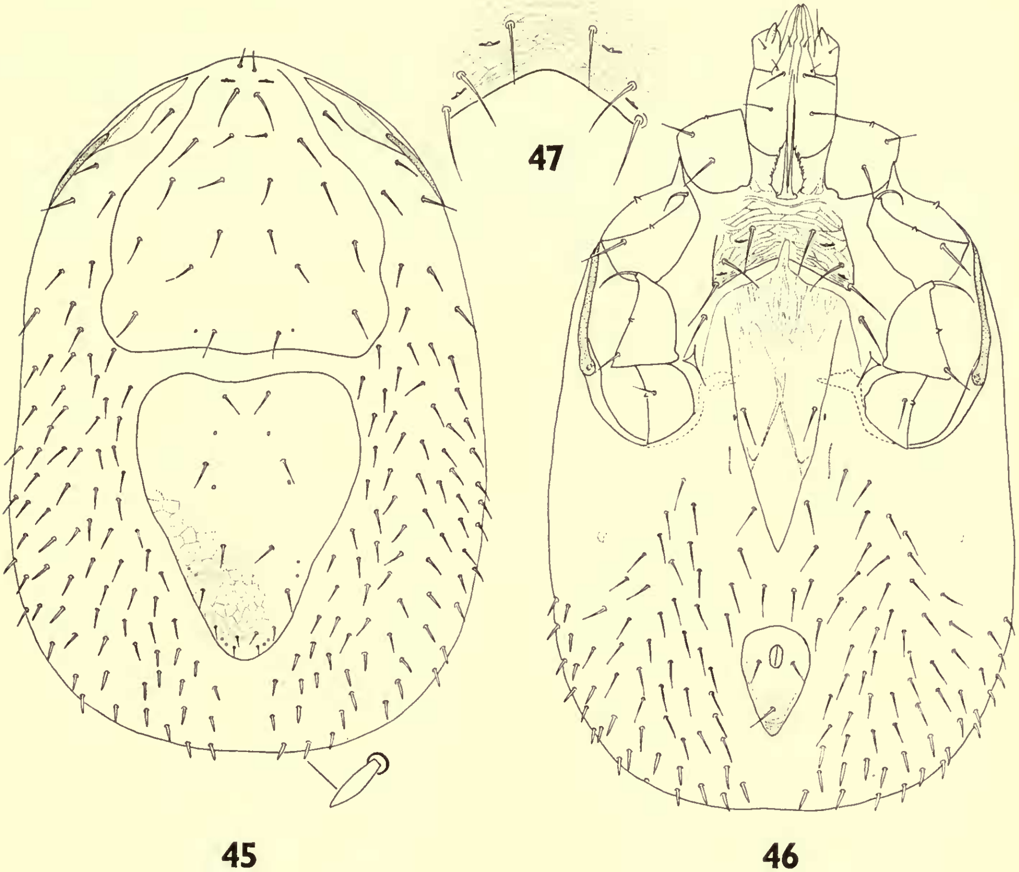
Figs. 43–44. *Steatonyssus* (*Steatonyssus*) *javensis javensis* (Oudemans). Dorsum (fig. 43) and venter (fig. 44) of protonymph.

Podonotal shield 228μ long, 168μ wide between setae *z*3, bearing eleven pairs of setae. Lengths of setae *i*2 and *i*3 subequal, about half the distance between *i*4 and *z*2 ; seta *i*3 about two-thirds the length of *z*1 ; seta *i*5 about seven-eighths the length of *z*3. Opisthonotal shield 204–228μ long, 156–168μ wide at the level of setae *J*1, bearing 7 pairs of setae. Setae *J*1–*J*3 about the same length as those of the *i* series ; length of *J*2 less than one-third the distance between *J*2 and *J*3 ; terminal setae (*Z*5) slightly shorter than the subterminals. Both shields have a reticulate pattern.

Sternal shield reticulate, not demarcated from the reticulate presternal area, lateral margins weakly defined, posterior margin more deeply concave than in *S. javensis javensis*. The posterior part of the shield has a more compressed pattern than the anterior part, but is not heavily sclerotized. Total length of shield about 40μ, length from level of first pair of setae 24–27μ, width between second pair of setae about 90μ. Sternal setae I and II subequal in length. Genital shield 108–111μ long from level of genital setae, 54μ wide between the setae ; length of setae about half the distance between their bases. Anal shield 60–63μ long to base of postanal seta, 51–57μ wide through middle of anus. Paranal setae level with posterior third of anus.



FIGS. 45–47. *Steatonyssus* (*Steatonyssus*) *javensis brevisetosus* ssp. nov. Dorsum with one enlarged seta (fig. 45), venter (fig. 46) and enlarged sternal shield (fig. 47) of female.

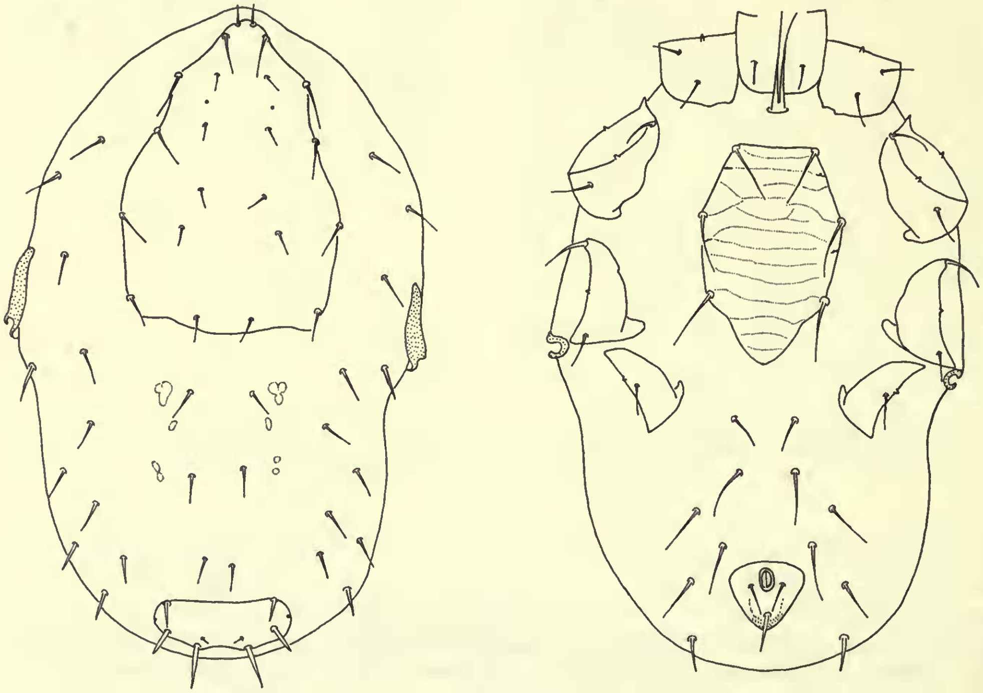
Integument of idiosoma bears numerous setae which become progressively shorter and stouter towards the caudal end of the body. The postero-dorsal setae are relatively shorter than in *S. javensis javensis*, having a maximum length of about 12μ. Peritremes extend to anterior half of coxa II ; peritrematal shields continue nearly to anterior margin of coxa I. Endopodal shields are present between coxae III and IV and a pair of weakly sclerotized metapodal shields is visible behind coxae IV.

Chaetotaxy of the legs typical for the genus. The antero-dorsal spine on coxa II has 2 or 3 minute denticles at its tip. Length of tibia I, 45μ ; tarsus I, 69μ ; tibia IV, 45μ ; tarsus IV, 78μ ; basal width of tarsus IV, 27μ.

MALE. Unknown.

PROTONYMPH (Text-figs. 48–49). Podonotal shield 147–153μ long, 87–93μ wide between setae *z*3, bearing eleven pairs of setae. Pygidial shield 30μ long, 66μ wide, with 3 pairs of relatively stout setae and a pair of minute subterminals. The terminal setae are relatively shorter and stouter than in *S. javensis javensis*. The weakly sclerotized mesonotal scutellae may be subdivided. Anal shield 27μ long to base of postanal seta, 33μ wide through middle of anus.

Chaetotaxy of legs normal. Anterior spine on coxa II appears to have small denticles at its tip. Length of tibia I, 27μ ; tarsus I, 40μ ; tibia IV, 22–24μ ; tarsus IV, 40μ.



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FIGS. 48–49. *Steatonyssus* (*Steatonyssus*) *javensis brevisetosus* ssp. nov. Dorsum (fig. 48) and venter (fig. 49) of protonymph.

HOSTS AND LOCALITIES. *Eptesicus tenuipinnis* (Peters), Uvira, Congo, collected by Drs. P. L. G. Benoit & N. Leleup, 2nd March, 1955. Holotype, 1 ♀ paratype and 10 protonymphs in the collection of the Musée royal de l'Afrique centrale, Belgium. Two ♀ paratypes (1963.11.11.60–61) and 3 protonymphs (1963.11.11.62–64) in the collection of the British Museum (Natural History).

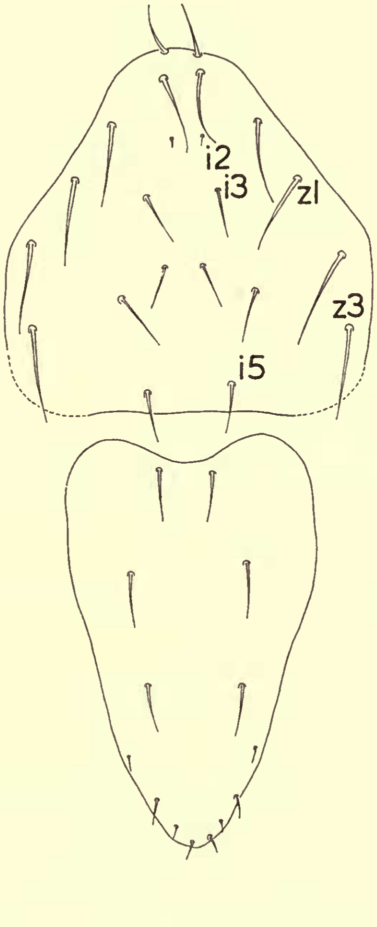
Eidolon helvum (Kerr), Stanleyville, Congo, collected by R. Collart, 2.vii.1929. Twenty-four female paratypes and 5 protonymphs in the collection of the Musée royal de l'Afrique Centrale, Belgium ; twelve female paratypes (1963.11.11.65–74) and 2 protonymphs in the collection of the British Museum (Natural History).

Myotis bocagei (Peters), Bamanya, Congo, collected by R. P. G. Hulstaert, 1956. One ♀, one protonymph in the collection of the Musée royal de l'Afrique centrale, Belgium.

Steatonyssus (Steatonyssus) joaquimi (Fonseca)

Ceratonyssus joaquimi Fonseca 1935, Mem. Inst. Butantan S. Paulo **9** : 89, figs. 1–6.
Steatonyssus joaquimi Fonseca 1948, Proc. zool. Soc. Lond. **118** : 317.

FEMALE (Text-figs. 50–51). Deutosternum has 8 teeth. Basal segment of chelicera 33μ, second segment 112μ, chela 40μ long.



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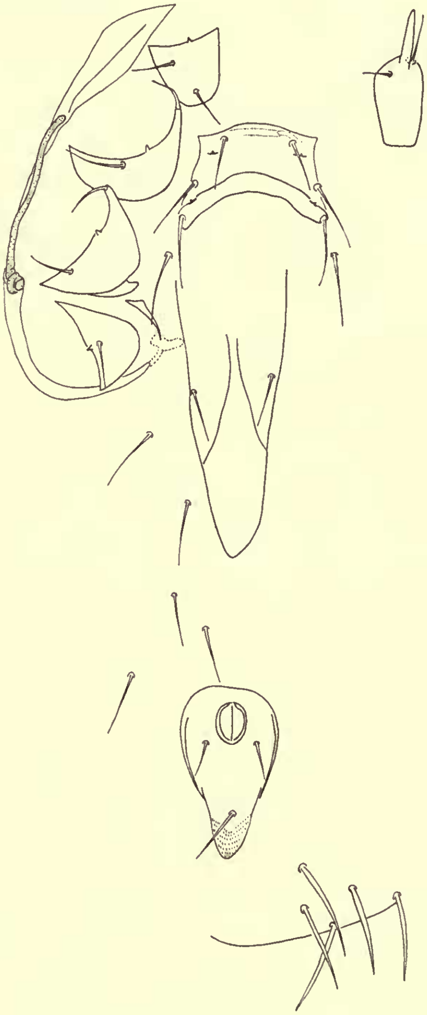

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FIGS. 50–51. *Steatonyssus* (*Steatonyssus*) *joaquimi* (Fonseca). Dorsal shields (fig. 50), venter and palptrochanter (fig. 51) of female.

Podonotal shield 276μ long, 240μ wide between setae *z*3, with eleven pairs of setae. Seta *i*2 extremely minute, about one-sixth the length of *i*3 ; seta *i*3 about two-thirds as long as *z*1 ; seta *i*5 about half as long as *z*3. Opisthonotal shield 300μ long, 180μ wide at level of setae *J*1, bearing 7 pairs of setae. Length of seta *J*2 about two-fifths the distance between *J*2 and *J*3 ; terminal setae not longer than the postero-laterals on the shield. Both shields appear to be reticulated, but the pattern is not distinct in the specimens examined.

Sternal shield reticulate, not demarcated anteriorly from the presternal area. Length from level of first pair of setae 42μ, width between second pair of setae 117μ. The posterior part of the shield is heavily sclerotized. First sternal seta about three-quarters as long as the second. Genital shield 126μ long from level of genital setae, 68μ wide between the setae ; length of setae about two-thirds the distance between their bases. Anal shield 96μ long to base of postanal seta, 75μ wide through middle of anus. Paranal setae level with posterior margin of anus and about three-fifths as long as the postanal seta.

The setae on the ventral part of the integument are about the same length as the genital setae, whereas those near the posterior margin and on the dorsum are longer (70μ) and stouter, tapering gradually. Peritreme extends to posterior fourth of coxa II, the peritrematal shield continuing to the anterior margin of coxa I. A small endopodal shield is present between coxae III and IV ; metapodal shields cannot be distinguished in these specimens.

Chaetotaxy of the legs typical for the genus. Length of tibia I, 96μ ; tarsus I, 165μ ; tibia IV, 87μ ; tarsus IV, 162μ ; basal width of tarsus IV, 36μ.

MALE. Described and figured by Fonseca (p. 92, figs. 3–4).

PROTONYMPH. Described and figured by Fonseca (p. 95, figs. 5–6).

HOSTS AND LOCALITIES. *Glossophaga soricina* (Pallas), Sao Paulo, Brazil (Fonseca, 1935). *Myotis albescens* (Geoffroy), Tacuaral, Paraguay, 12th November, 1900 [2 ♀♀ in the collection of the British Museum (Natural History)].

Steatonyssus (Steatonyssus) longipes Radovsky & Yunker

Steatonyssus longipes Radovsky & Yunker 1963, J. Parasit. **49** : 334, figs. 1–9.

FEMALE. Deutosternum has 8 teeth. Basal segment of chelicera 30μ, second segment 117μ, chelae about 45μ long.

Podonotal shield 264μ long, 198μ wide between setae *z*3, reticulate, bearing eleven pairs of setae. Length of seta *i*2 about half that of *i*3, and about half the distance between *i*4 and *z*2 ; seta *i*3 about two-thirds as long as *z*1 ; seta *i*5 slightly shorter than *z*3. Opisthonotal shield 336μ long, 156μ wide at the level of setae *J*1, bearing 7 pairs of setae. Setae *J*1–*J*3 relatively long and stout, length of *J*2 about three-fifths the distance between *J*2 and *J*3. Terminal setae slightly longer than the postero-laterals on the shield, about one-third the length of *J*2 ; subterminal setae minute. The ornamentation of the shield is not clearly visible in the specimen examined.

Anterior margin of sternal shield not sharply demarcated from the presternal area ; posterior part of shield has a granular appearance and a more compressed reticulate pattern than the anterior part. Length of shield from level of setae I is 54μ, width between setae II is 120μ. Sternal and metasternal setae subequal in length. Genital shield 126μ long from level of genital setae, 70μ wide between the setae ; length of genital setae slightly more than half the distance between their bases. The shield has a sharply pointed antero-median process extending over the sternal shield. The anal shield, which has an irregular anterior margin, is 123μ long to the base of the postanal seta, 87μ wide through the middle of the anus. Paranal setae level with the posterior margin of the anus, about the same length as the postanal seta.

Integument of idiosoma bears numerous setae. The ventral setae are slender and slightly longer than the genitals ; the postero-ventral and dorsal setae are stouter, the postero-dorsals having a maximum length of 54μ. Peritreme terminates behind anterior margin of coxa III ; peritrematal shield interrupted at level of posterior border of coxa II, the anterior leaf-like portion lying over coxae I and II. Very weakly sclerotized endopodal shields are visible between coxae III and IV ; metapodal shields cannot be distinguished with certainty.

Chaetotaxy of the legs typical for the genus (confirmed by Dr. F. Radovsky for six other specimens). Length of tibia I, 114μ ; tarsus I, 234μ ; tibia IV, 108μ ; tarsus IV, 234μ ; basal width of tarsus IV, 42μ.

MALE. Unknown.

PROTONYMPH. Podonotal shield 174μ long, 138μ wide between setae *z*3, bearing eleven pairs of setae. Pygidial shield 66μ long, 96μ wide, with 3 pairs of relatively long, stout, subequal setae and one pair of minute, subterminal microsetae. Anal shield 45μ long to base of postanal seta, 50μ wide through middle of anus.

Chaetotaxy of legs normal. Length of tibia I, 48μ ; tarsus I, 111μ ; tibia IV, 48μ ; tarsus IV, 111μ.

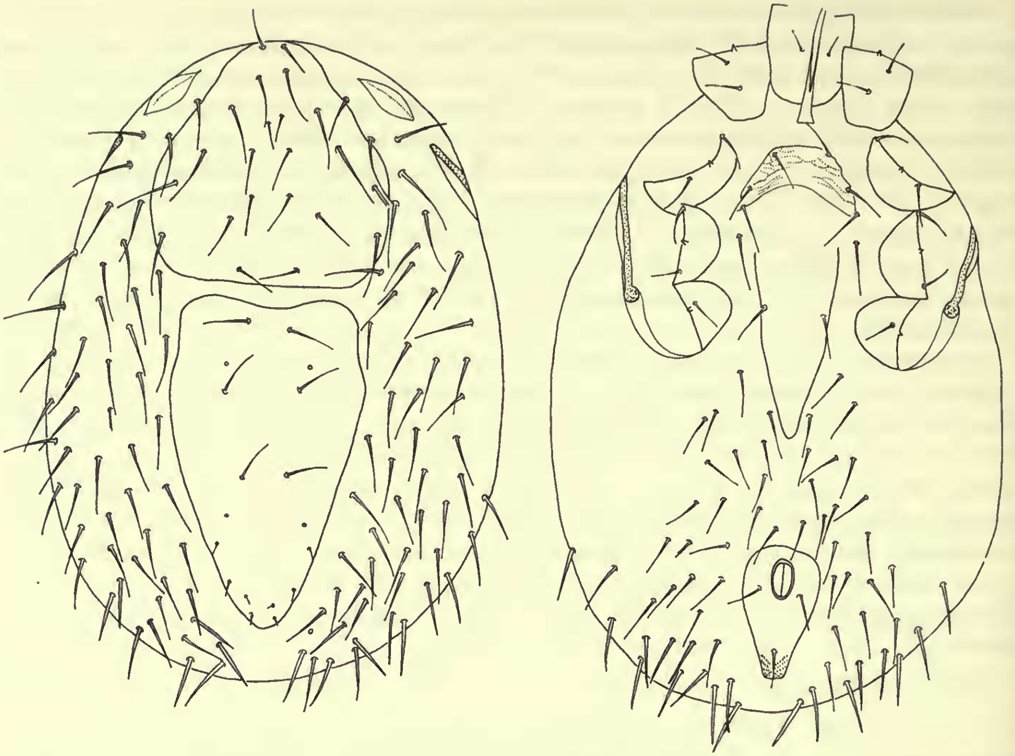
HOST AND LOCALITY. *Nycteris thebaica thebaica* Geoffroy, Abu Rawash, Imbaba, Giza, Egypt, collected by H. Hoogstraal, 9th February, 1960 (1 ♀ and 1 protonymphal paratype presented by Dr. F. Radovsky).

Steatonyssus (Steatonyssus) natalensis Zumpt & Patterson

Steatonyssus natalensis Zumpt & Patterson 1951, J. ent. Soc. S. Afr. **14** : 86, fig. 8.

FEMALE (Text-figs. 52–53). Deutosternum has 9 teeth. Basal segment of chelicera 30μ, second segment 96μ, chela 40μ long.

Podonotal shield 294μ long, 252μ wide between setae *z*3, bearing eleven pairs of setae. Length of setae *i*2 equal to the distance between *i*4 and *z*2, and about two-thirds the length of *i*3 ; seta *i*3 two-thirds as long as *z*1 ; seta *i*5 about three-fifths as long as *z*3. Opisthonotal shield 378μ long, 204μ wide at level of setae *J*1, bearing 7 pairs of setae. Setae *J*1–*J*3 relatively long, length of *J*2 half the distance between *J*2 and *J*3. The 4 pairs of posterior setae are very short, the terminals not longer than the postero-laterals. Both shields have a reticulate pattern.



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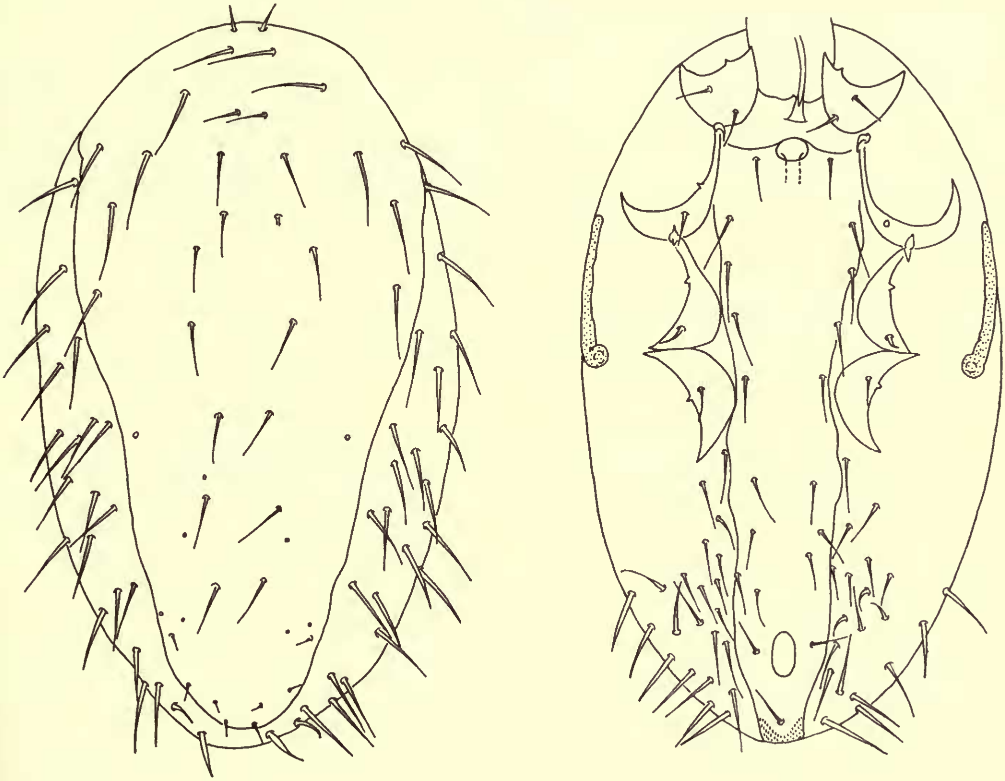
FIGS. 52–53. *Steatonyssus* (*Steatonyssus*) *natalensis* Zumpt & Patterson. Dorsum (fig. 52) and venter (fig. 53) of female.

Sternal shield about 40µ long, 114µ wide between second pair of setae. The specimen is over-cleared and flattened so that the boundaries and ornamentation of the shield are very indistinct. The posterior part of the shield does not appear to be thickened, but its reticulations, where visible, are more compressed than on the anterior part of the shield. Sternal setae subequal in length, the first pair very slightly shorter than the others. Genital shield 150µ long from level of genital setae, 70µ wide between the setae ; length of setae a little more than half the distance between their bases. Anal shield 124µ long to base of postanal seta, 90µ wide through middle of anus. Paranal setae antero-lateral to posterior margin of anus.

Integument of idiosoma bears numerous setae, including about 20 pairs of slender ventral setae which are about the same length as the genitals. Near the posterior margin of the body the setae are stout and blade-like, tapering rather abruptly at the extreme tip, and have a maximum length of about 63µ. On the remaining part of the dorsum the setae are about the same length as the posterior ones, but taper gently. Peritremes reach middle of coxa II ; peritrematal shields interrupted. Endo- and metapodal shields are not visible in this specimen.

Chaetotaxy of the legs typical for the genus. Length of tibia I, 96μ ; tarsus I, 156μ ; tibia IV, 96μ ; tarsus IV, 180μ ; basal width of tarsus IV, which is greatly flattened, is 50μ.

Male (Text-figs. 54–55). Basal segment of chelicera 24μ, second segment 54μ, chela and spermadactyl 45μ. Dorsal shield 474μ long, 198μ wide between setae *z*3. It bears 12 pairs of setae on the anterior and 7 pairs on the posterior part.



Figs. 54–55. *Steatonyssus* (*Steatonyssus*) *natalensis* Zumpt & Patterson. Dorsum (fig. 54) and venter (fig. 55) of male.

Holoventral shield bears 5 pairs of setae in the sternito-genital region and 4 pairs in the preanal region. The setae on the unsclerotized integument are less numerous than in the female, but similar in appearance. Peritremes barely extend beyond anterior margin of coxa III.

Chaetotaxy of legs as in female. Length of tibia I, 70μ ; tarsus I, 114μ ; leg IV is bent so that the segments can not be measured accurately ; length of tibia IV approximately 75μ ; tarsus IV approximately 130μ.

Protonymph. Unknown.

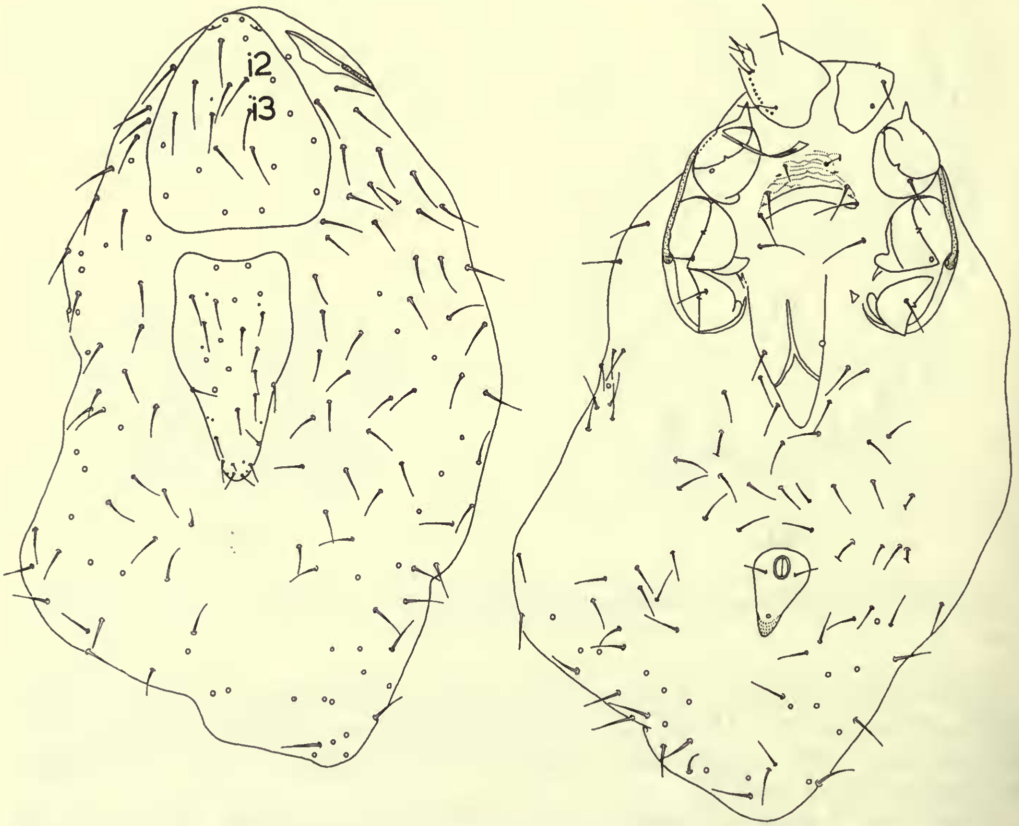
Hosts and Localities. *Miniopterus schreibersi natalensis* (Smith) from Pietermaritzburg, Natal, South Africa. (Holotype ♀ and paratype ♂ on loan from the South African Institute for Medical Research, Johannesburg.)

Steatonyssus (Steatonyssus) nyassae (Hirst)

Liponyssus nyassae Hirst 1922, Proc. zool. Soc. Lond. (1921) : 777.

Female (Text-figs. 56–57). The gnathosoma is lying on its side so that details of its structure are not clearly visible.

Podonotal shield 264μ long, 186μ wide between setae *z*3, bearing eleven pairs of setae. Setae *i*2 and *i*3 subequal, nearly one and a half times the distance between *i*4 and *z*2 ; seta *i*3 about four-fifths the length of *z*1. Opisthonotal shield 276μ long, 140μ wide at the level of setae *J*1, bearing 27 setae. Terminal setae slightly shorter than the postero-laterals on the shield. Both shields have a reticulate pattern.



56 **57**

Figs. 56–57. *Steatonyssus* (*Steatonyssus*) *nyassae* (Hirst). Dorsum (fig. 56) and venter (fig. 57) of female.

Sternal shield 63μ long, 99μ wide between setae II. The posterior portion of the shield forms a heavily sclerotized band. The length of the first pair of sternal setae cannot be determined as one seta is broken and the other is not lying flat. Genital shield 102μ long from level of genital setae, 72μ wide between the setae, with a pair of strongly marked lines which converge a little behind the genital setae. Anal shield 87μ long to base of postanal seta, 70μ wide through middle of anus. Paranal setae situated near posterior margin of anus.

Ventral setae of the integument about as long as the genital setae ; marginal setae stouter, the postero-dorsals having a maximum length of 45μ. Peritreme extends to middle of coxa II ; peritrematal shield continues anteriorly to middle of coxa I. A small endopodal shield is present between coxae III and IV ; metapodal shields cannot be distinguished in this specimen.

Chaetotaxy of the legs typical for the genus. Length of tibia I, 93μ ; tarsus I, 156μ ; tibia IV, 87μ ; tarsus IV cannot be measured.

MALE AND PROTONYMPH. Unknown.

HOST AND LOCALITY. " Elephant Shrew ", Chiromo, Nyasaland [type specimen in the collection of the British Museum (Natural History)]. *Scotophilus murinoflavus* (Heuglin), Torit, Sudan (Zumpt and Till, 1954).

Steatonyssus (Steatonyssus) occidentalis (Ewing)

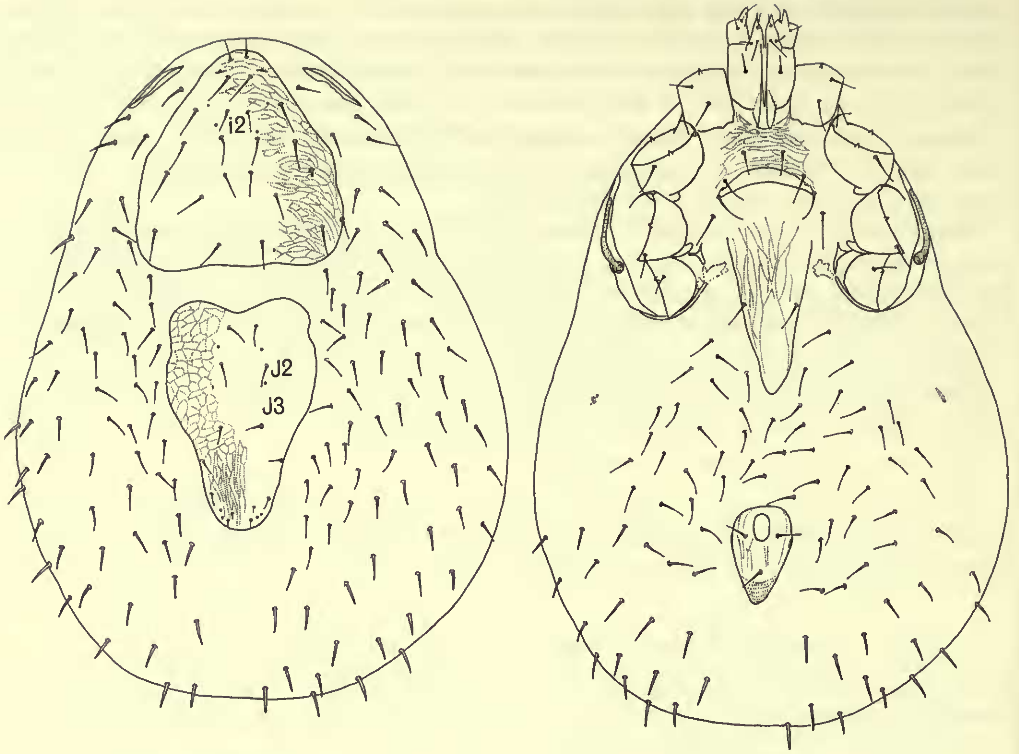
Ceratonyssus occidentalis Ewing 1933, Proc. U.S. nat. Mus. **82** (2971) : 10, pl. 3, fig. 5, pl. 4, fig. 1.
Steatonyssus occidentalis, Fonseca 1948, Proc. zool. Soc. Lond. **118** : 319 ; Radovsky & Furman 1963, Ann. ent. Soc. Amer. **56** : 272, figs.

FEMALE (Text-figs. 58–59). Deutosternal teeth not clearly visible. Basal segment of chelicera 24–27μ, second segment 82–99μ, chela 36μ long.

Podonotal shield reticulate, 252–276μ long, 210–222μ wide between setae *z*3. It bears eleven pairs of setae. Length of seta *i*2 about three-quarters that of *i*3 and slightly more than half the distance between *i*4 and *z*2 ; setae *i*3 and *i*5 almost as long as *z*1 and *z*3 respectively. Opisthonotal shield 270–288μ long, 168–180μ wide at the level of setae *J*1, with a reticulate pattern anteriorly and striations posteriorly. It bears 7 paris of setae, the terminals and subterminals being extremely small. Length of seta *J*2 is about one-third the distance between *J*2 and *J*3.

Sternal shield reticulate, anterior and lateral margins not very sharply defined, posterior portion heavily sclerotized. Length of shield 51–60μ, width between second pair of setae 102–110μ. Sternal and metasternal setae subequal in length. Genital shield 120–130μ long from level of genital setae, 66–68μ between the setae, with a pair of well marked, converging lines. Length of genital setae a little less than half the distance between their bases. Anal shield 78–84μ long to base of postanal seta, 72–78μ wide through middle of anus ; paranal setae near posterior margin of anus, about the same length as the postanal seta.

Integument of idiosoma bears numerous setae. The ventro-median ones are slender and about the same length as the genital setae. The postero-ventral and postero-dorsal setae are stouter and blade-like and have a maximum length of 30μ.



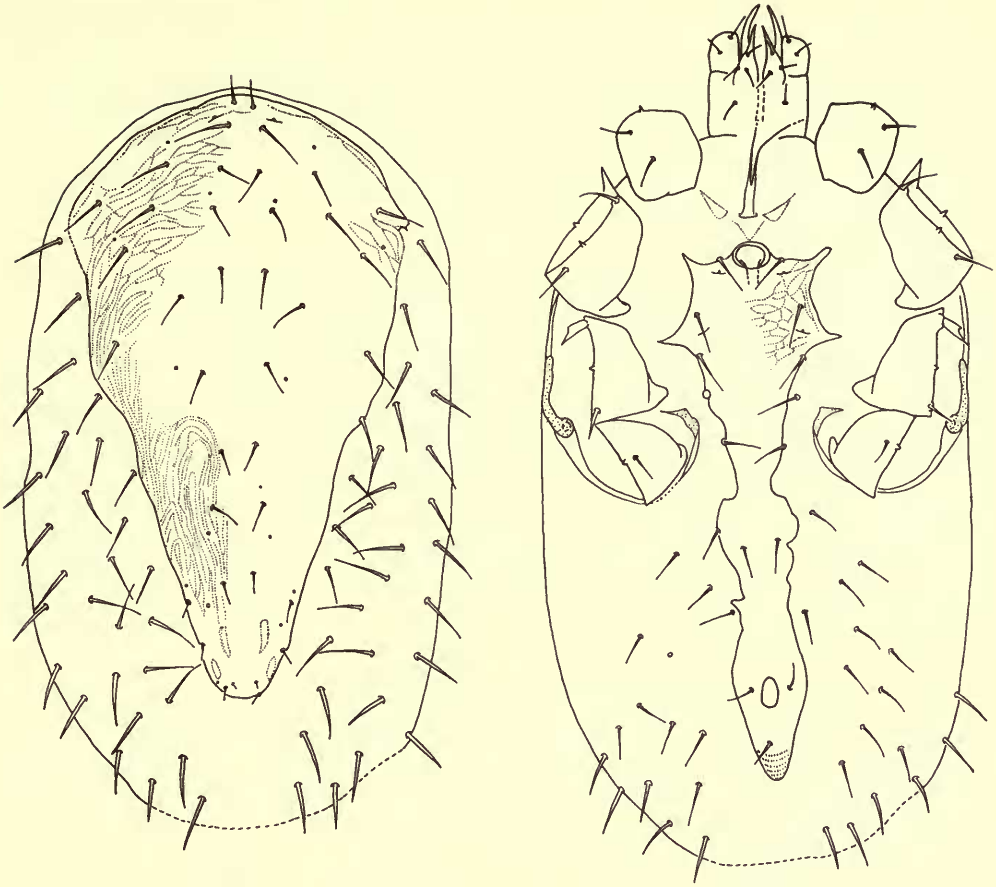
58 **59**

FIGS. 58–59. *Steatonyssus* (*Steatonyssus*) *occidentalis* (Ewing). Dorsum (fig. 58) and venter (fig. 59) of female.

The remaining dorsal setae are a little more slender, but are not as finely pointed as the ventro-median setae. Peritremes extend almost to anterior margin of coxa III ; peritrematal shields continue to posterior fourth of coxa II, where they are interrupted, the leaf-like anterior portion lying over the anterior half of coxa II and the posterior half of coxa I. A pair of endopodal shields is present between coxae III and IV, and a pair of very weakly sclerotized areas postero-lateral to coxae IV may represent the metapodal shields.

Chaetotaxy of the legs follows the typical *Steatonyssus* pattern. Length of tibia I, 66μ ; tarsus I, 117μ ; tibia IV, 60–69 ; tarsus IV, 120–129μ ; basal width of tarsus IV, 36μ.

MALE (Text-figs. 60–61). Basal segment of chelicera 27μ, second segment 66μ, chela and spermadactyl 40μ long. Dorsal shield 456μ long, 186μ wide between setae *z*3, bearing 19 pairs of setae and an additional marginal seta on one side. The anterior part of the shield, from about the level of seta *z*2, has a reticulate pattern. The remaining part of the shield has a pattern of striations which form whorls, rather like fingerprints, lateral to setae *J*1.



FIGS. 60–61. *Steatonyssus* (*Steatonyssus*) *occidentalis* (Ewing). Dorsum (fig. 60) and venter (fig. 61) of male.

Holoventral shield very narrow with irregular margins, bearing 15 setae. The shield is reticulate anteriorly, but from a little behind the metasternal setae there is a pattern of striations which continues on to the anterior part of the anal region. Paranal setae level approximately with middle of anus, about the same length as the postanal seta.

Unsclerotized integument of idiosoma bears about 45 pairs of setae of which 10–11 pairs are ventral in position and about the same length as the setae on the shield ; near the posterior margin and on the dorsum the setae are stouter and blade-like. Peritremes extend a little beyond the middle of coxa III, the peritrematal shields continuing to the posterior margin of coxa II.

Chaetotaxy of the legs as in the female. Coxa III has a broad, leaf-like, anterior seta. Length of tibia I, 54μ ; tarsus I, 87μ ; tibia IV, 57μ ; tarsus IV, 93μ.

PROTONYMPH. Podonotal shield 80μ long, 54μ wide between setae *z*3, with eleven pairs of setae. Pygidial shield with anterior, lateral and terminal setae, increasing in size in that order, and a pair of minute subterminals. The shield cannot be measured as the specimen is slightly damaged. Two pairs of mesonotal scutellae are present at the level of, and behind, setae *J*1. Anal shield 36μ long to base of postanal seta, 48μ wide through middle of anus.

Chaetotaxy of legs normal. Length of tibia I, 30μ ; tarsus I, 54μ ; tibia IV, 30μ ; tarsus IV, 54μ.

HOSTS AND LOCALITIES. *Eptesicus fuscus fuscus* (Palisot de Beauvois)?, North Fork, Madera Co., California, U.S.A., 28th July, 1950 (♂, ♀, protonymph presented by Dr. F. Radovsky). *Eptesicus fuscus pallidus* Young, North Fork, Madera Co., California, U.S.A., 14th July, 1950 (♀ presented by Dr. F. Radovsky). " Common Brown Bat," Adel, Oregon, U.S.A., 19th August, 1930 (cotype ♀ lent by United States National Museum). Radovsky and Furman (1963) record the following :— *Myotis velifer* (J. A. Allen), Los Lingos Canyon, Briscoe Co., Texas, U.S.A. *Corynorhinus* sp., Post, Garza Co., Texas, U.S.A. *Tadarida brasiliensis* (Geoffroy-Saint-Hilaire), Devil's Sink Hole, Edwards Co., Texas and Willcox, Cochise Co., Arizona, U.S.A. Yunker (1958) records this species from the following :— *Myotis lucifugus* (Le Conte), Maryland, U.S.A. *Lasiurus borealis* (Müller), Washington, D.C., U.S.A.

Steatonyssus (Steatonyssus) periblepharus Kolenati

Steatonyssus periblepharus Kolenati 1858, Wien. ent. Monatschr. **2** : 6 ; 1859, S.B. Akad. Wiss. Wien. **35** : 186, pl. 8, fig. 34 ; Oudemans 1936, Krit. Hist. Over. Acar. A (3) : 288 ; Willmann 1936, Zool. Anz. **114** : 153 ; Strandtmann & Wharton 1958, Manual of Mesostigmatid Mites : 113.

Steatonyssus brachypeltis Kolenati 1858, Wien. ent. Monatschr. **2** : 6 ; 1859, S. B. Akad. Wiss. Wien. **35** : 187, pl. 9, fig. 35.

Leiognathus arcuatus, Berlese 1889, Acar. Myr. Scorp. Italia fasc. 53 no. 8 (non *Dermanyssus arcuatus* Koch 1839).

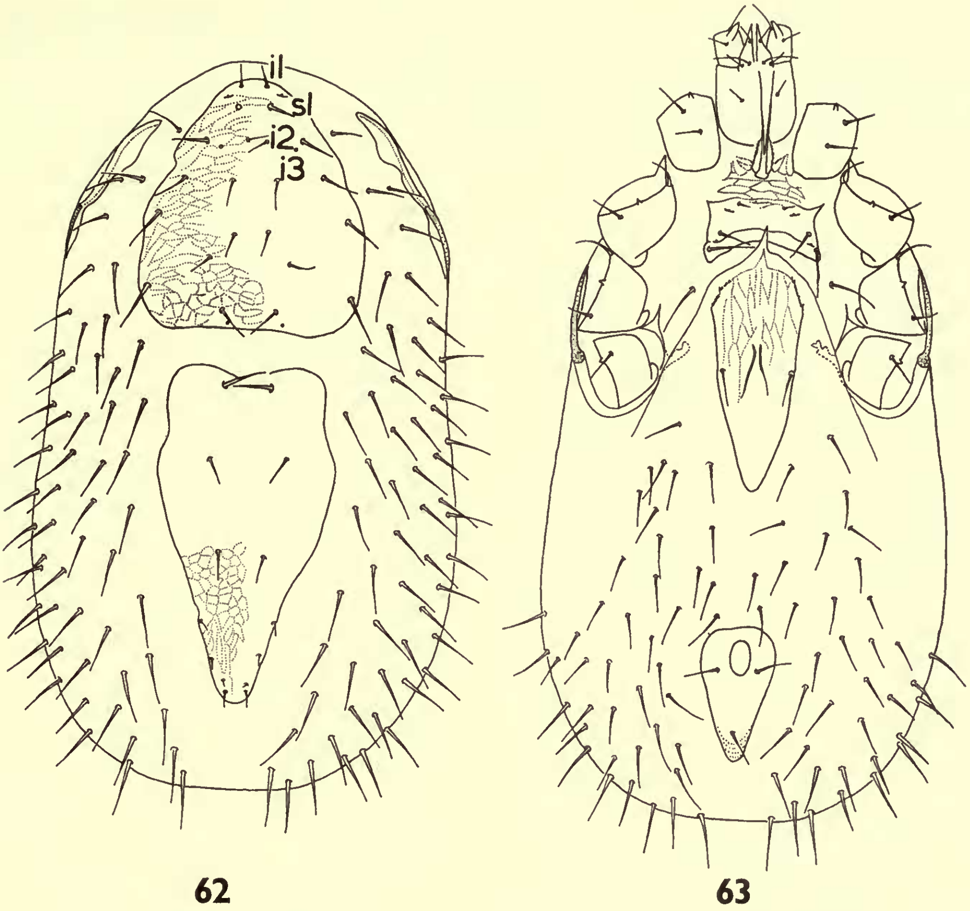
Liponyssus musculi, Oudemans 1902, Tijdschr. ned. Dierk. Ver. (2) **7** : 293, pl. 8, fig. 19–22, pl. 9, fig. 23–26 (nec *Acarus musculi* Schrank 1803, nec *Dermanyssus musculi* Koch 1836).

Liponyssus chiropteralis Hirst 1922, Proc. zool. Soc. Lond. (1921) : 776.

FEMALE (Text-figs. 62–63). Deutosternum has 8 teeth. Basal segment of chelicera 42μ, second segment 105μ, chelae 45–48μ long.

Podonotal shield 300–306μ long, 234–252μ wide between setae *z*3, bearing eleven pairs of setae. Setae *i*2 slightly shorter than *i*3, about three-quarters the distance between *i*4 and *z*2. Seta *i*3 half to two-thirds the length of *z*1 ; seta *i*5 half as long as *z*3. Opisthonotal shield 372–396μ long, 186–198μ wide at the level of setae *J*1, bearing 7 pairs of setae. Length of seta *J*2 about one-third the distance between *J*2 and *J*3 ; the 4 posterior pairs of setae are very short and fine. Both shields have a reticulate pattern.

Sternal shield not sharply demarcated from the reticulate presternal area ; concave posterior portion of shield heavily sclerotized. Length of shield 45–57μ, width between second pair of setae 114–126μ. Sternal seta I relatively short, not



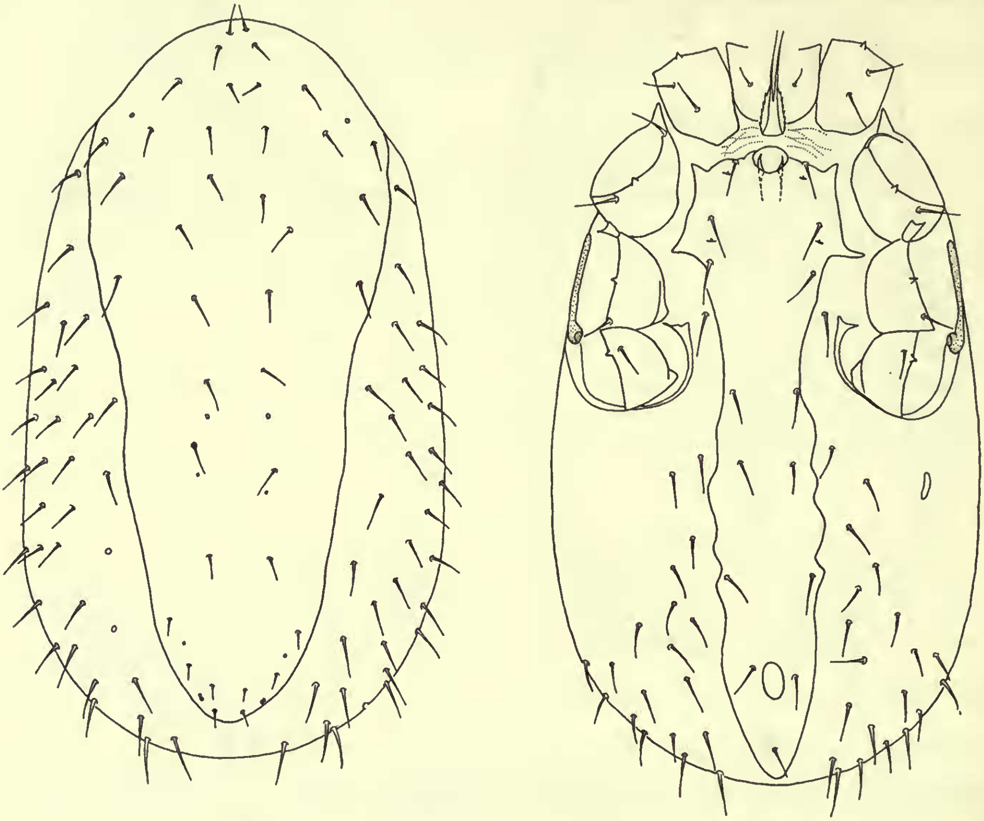
Figs. 62–63. *Steatonyssus* (*Steatonyssus*) *periblepharus* Kolenati. Dorsum (fig. 62) and venter (fig. 63) of female.

more than half as long as seta II. Genital shield 144–156μ long from level of genital setae, 78–87μ wide between the setae ; length of genital setae little more than half the distance between their bases. Anal shield pear-shaped, 126–135μ long to base of postanal seta, 84–94μ wide through middle of anus. Paranal setae level with posterior third of anus, approximately as long as the postanal seta.

Integument of idiosoma bears numerous setae, the dorsal and marginal ones being longer (65μ) and stouter than the ventral ones. Peritremes reach middle of coxa II, the peritrematal shields continuing to the middle of coxa I. Endopodal shields present between coxae III and IV ; metapodal shields not visible.

Chaetotaxy of the legs follows the typical *Steatonyssus* pattern. Coxa II bears a large antero-dorsal spine which usually appears pointed, but in certain positions it can be seen to terminate in 4 small denticles. Length of tibia I, 96–102μ ; tarsus I, 156–162μ ; tibia IV, 90–102μ ; tarsus IV, 174–192μ ; basal width of tarsus IV, 42μ.

Male (Text-figs. 64–65). Basal cheliceral segment 30μ, second segment 66μ, chela and spermadactyl 60μ long. Dorsal shield 552–564μ long, 186–192μ wide between setae *z*3, bearing 12 pairs of setae on the anterior half and 7 pairs on the posterior part. It has an overall reticulate pattern.



Figs. 64–65. *Steatonyssus* (*Steatonyssus*) *periblepharus* Kolenati. Dorsum (fig. 64) and venter (fig. 65) of male.

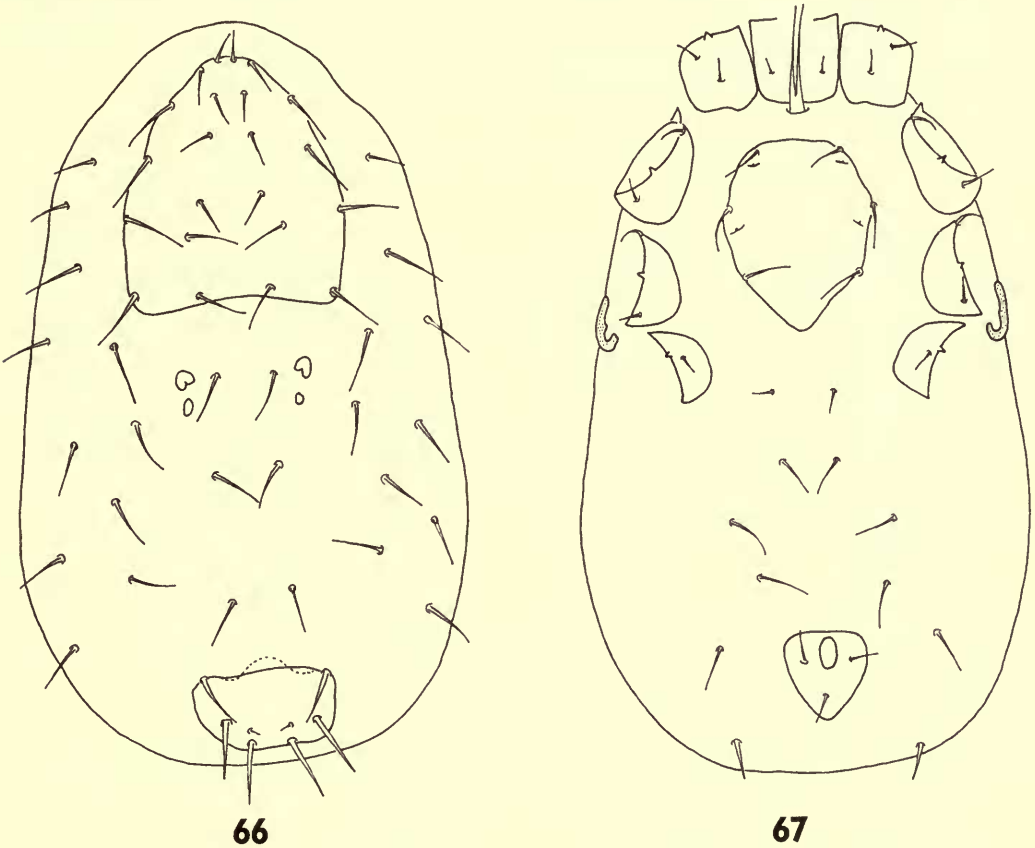
Holoventral shield bears 4 pairs of setae in the sternito-genital region, the metasternals being situated on the integument beside the shield. From 4 to 8 setae are present in the preanal region. Integument of the idiosoma bears 50–52 pairs of setae which are longer and stouter towards the caudal end of the body. Peritremes extend to the anterior margin of coxa III.

Chaetotaxy of legs as in the female. Anterior seta on coxa III very broad with two terminal processes, one rather flat and the other slightly longer and pointed. Length of tibia I, 75–78μ ; tarsus I, 132μ ; tibia IV, 72μ ; tarsus IV, 126μ.

Protonymph (Text-figs. 66–67). Basal segment of chelicera 15μ, second segment

60μ, chela 27μ long. Podonotal shield 160μ long, 132μ wide between setae *z3*, bearing eleven pairs of setae. Pygidial shield 66μ long, 93μ wide, with 4 pairs of setae, 3 relatively long, stout, pairs and a pair of very short subterminal setae. Two pairs of small mesonotal scutellae are present at the level of setae *J1*. Anal shield triangular, 48μ long to base of postanal seta, 54μ wide through middle of anus.

Chaetotaxy of legs normal. Length of tibia I, 45μ ; tarsus I, 84μ ; tibia IV, 42μ ; tarsus IV, 84μ.



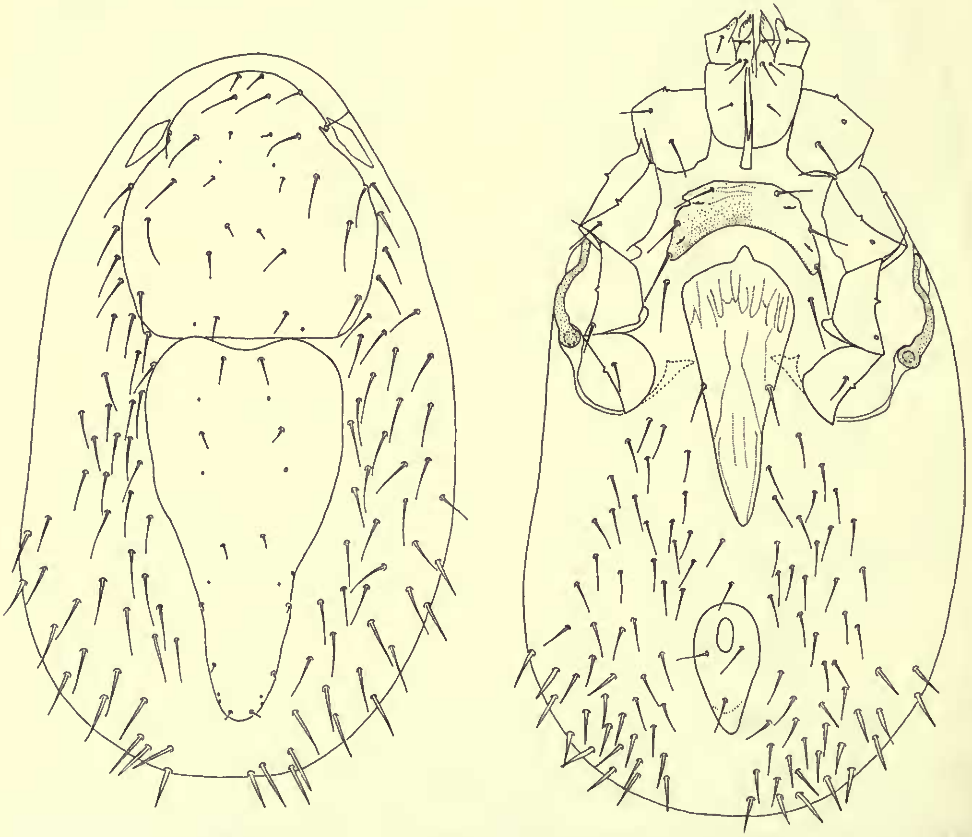
FIGS. 66–67. *Steatonyssus* (*Steatonyssus*) *periblepharus* Kolenati. Dorsum (fig. 66) and venter (fig. 67) of protonymph.

HOSTS AND LOCALITIES. The following material in the collection of the British Museum (Natural History) has been examined:— *Pipistrellus kuhli* (Kuhl), Algeria. *Pipistrellus pipistrellus* (Schreber), Stoke Poges, Buckinghamshire, 15th August, 1956 ; Colchester, Essex, December, 1961–January, 1962 (coll. G. B. Thompson) ; Coles Hill, Co. Fermanagh, N. Ireland, 14th October, 1960 (coll. S. Skillen) ; Enniskillen, Co. Fermanagh, N. Ireland, May–June, 1962 (coll. R. Palmer). *Myotis mystacinus* (Kuhl), Easington, Yorkshire, 1st September, 1931 (coll. T. Warwick) ; Styal, Cheshire, 30th April, 1932 (coll. C. Jones). " Bats " from Ain Sefra, S.W. Algeria.

The following additional hosts and localities have been recorded in the literature :— *Pipistrellus pipistrellus* (Schreber), Germany ; *Myotis capaccinii* (Bonaparte), Hungary and Germany ; *Myotis emarginatus* (Geoffroy), Germany (Kolenati, 1859). *Eptesicus serotinus* (Schreber), Germany (Oudemans, 1902).

Steatonyssus (Steatonyssus) radovskyi sp. nov.

FEMALE (Text-figs. 68–69). Deutosternum appears to have 9 or 10 teeth, but these are not very distinct in the specimens examined. Basal segment of chelicera 27µ, second segment 87µ, chelae 36µ long.



FIGS. 68–69. *Steatonyssus* (*Steatonyssus*) *radovskyi* sp. nov. Dorsum (fig. 68) and venter (fig. 69) of female.

Podonotal shield 282µ long, 222µ wide between setae *z*3. It bears 13 pairs of setae, one pair being on the extreme margin of the shield ; one specimen has an additional marginal seta on one side. Setae *i*2 minute, three-fifths as long as *i*3 and less than one-third the distance between *i*4 and *z*2 ; seta *i*3 about one-third the length of *z*1 ; seta *i*5 less than half as long as *z*3. Opisthonotal shield 354–375μ long, 180–198μ wide at level of setae *J*1. It bears 6 pairs of setae of which *J*1 is the longest ; length of seta *J*2 less than one-fifth the distance between *J*2 and *J*3. The postero-lateral and terminal setae are minute ; the subterminals are absent. Both shields are reticulate. Sternal shield 45μ long, 135–140μ wide between second pair of setae ; it has a granular appearance with a few faint reticulations, and the posterior region is only slightly denser than the anterior region. Sternal and metasternal setae subequal, the first pair being very slightly shorter than the others. Genital shield 135–144μ long from level of genital setae, 68–75μ wide between the setae; length of genital setae about three-quarters the distance between their bases. Anal shield 99–102μ long to base of postanal seta, 70–75μ wide through middle of anus. Paranal setae level with posterior margin of anus, about the same length as the postanal seta.

Integument of idiosoma bears about 94 pairs of setae ; the ventral ones are slender and hair-like, the dorsal ones are slightly longer and the posterior ones are thick and spine-like. The postero-dorsal setae have a maximum length of 48μ, the caudals are relatively shorter and stouter, measuring 40μ. Peritremes short, scarcely extending beyond the anterior margin of coxa III ; peritrematal shields interrupted, the anterior leaf-like portion lying over the anterior part of coxa II and the posterior margin of coxa I. Endopodal and metapodal shields are not distinguishable in the specimens examined.

Chaetotaxy of the legs typical for the genus. Length of tibia I, 66–69μ ; tarsus I, 130–135μ ; tibia IV, 70–75μ ; tarsus IV, 156–165μ ; basal width of tarsus IV, 48μ.

MALE AND PROTONYMPH. Unknown.

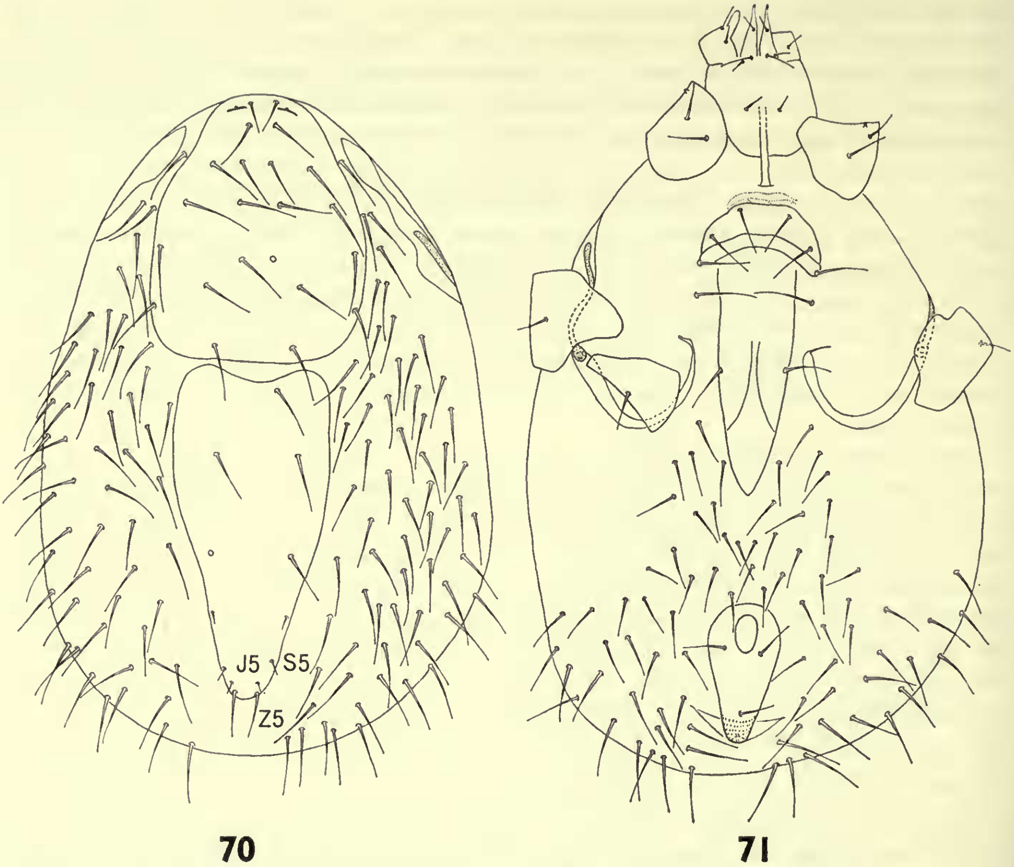
HOST AND LOCALITIES. *Dasypterus intermedius* (H. Allen), 6 females collected by R. B. Eads, Military Highway, Cameron Co., U.S.A., 27th February, 1962 (presented by Capt. V. J. Tipton). One female collected by J. Wiseman, San Antonio, Texas, U.S.A., 4th October, 1962 (presented by Dr. F. Radovsky). Holotype (1963. 11.11.34), 4 ♀ paratypes (1963.11.11.35–38) in the collection of the British Museum (Natural History) ; 1 ♀ paratype presented to Dr. F. Radovsky ; 1 ♀ paratype deposited in the United States National Museum, Washington, D.C.

Steatonyssus (Steatonyssus) spinosus Willmann

Steatonyssus spinosus Willmann 1936, Zool. Anz. **114** : 152, figs. 1–5.

FEMALE (Text-figs. 70–71). The number of deutosternal teeth cannot be determined. Basal segment of chelicera 40μ, second segment 120μ, chela about 48μ long.

Podonotal shield 295μ long, 220μ wide between setae *z*3, bearing eleven pairs of setae. Length of setae *i*2 approximately equal to the distance between *i*4 and *z*2, and about four-fifths the length of *i*3 ; seta *i*3 about five-sixths as long as *z*1 ; seta *i*5 slightly shorter than *z*3. Opisthonotal shield 342μ long, 168μ wide at the level of seta *J*1, with 7 pairs of setae (one member of the first pair is absent in the specimen examined). Length of seta *J*2 slightly more than half the distance between



Figs. 70–71. *Steatonyssus* (*Steatonyssus*) *spinosus* Willmann. Dorsum (fig. 70) and venter (fig. 71) of female.

*J*2 and *J*3 ; terminal setae about 45μ long, two and a half times as long as the postero-lateral setae on the shield. Both shields have a reticulate pattern.

Sternal shield about 48μ long, 114μ wide between second pair of setae ; anterior and lateral margins rather indistinct, posterior portion heavily sclerotized. Sternal and metasternal setae subequal in length. Genital shield 138μ long from level of genital setae, 75μ wide between the setae ; length of genital setae nearly as long as the distance between their bases. Anal shield elongate, pear-shaped, 123μ long to base of postanal seta, 80μ wide through middle of anus. Paranal setae level with posterior margin of anus, slightly longer than postanal seta.

Integument of idiosoma bears numerous setae, the dorsal and posterior setae being coarser than the ventrals ; the postero-dorsal setae have a maximum length of 72μ. Peritreme extends a short distance beyond the anterior margin of coxa III ; peritrematal shield continues to the middle of coxa I. Endopodal shields are present between coxae III and IV, and a pair of weakly sclerotized metapodal shields is visible behind coxae IV.

Chaetotaxy of the legs typical for the genus. Length of tibia I, 96μ ; tarsus I, 180μ ; tibia IV, 96μ ; tarsus IV, 192μ ; basal width of tarsus IV, which is somewhat flattened, is 54μ.

MALE AND PROTONYMPH. Unknown.

HOST AND LOCALITY. *Solenodon paradoxus* Brandt, Hamburg Zoological Institute, December, 1935 [1 ♀ in the collection of the British Museum (Natural History)]. *Vespertilio superans* Thomas, Voroshilov, U.S.S.R., 7th July, 1946 (1♀ amongst some specimens of *S. superans* sent by Dr. N. G. Bregetova).

Steatonyssus (Steatonyssus) sudanensis (Hirst)

Liponyssus sudanensis Hirst 1926, Proc. zool. Soc. Lond. **3** : 835.

FEMALE (Text-figs. 72–73). Deutosternum has 9 teeth. Basal segment of chelicera 27μ, second segment 135μ, chelae 36μ long.

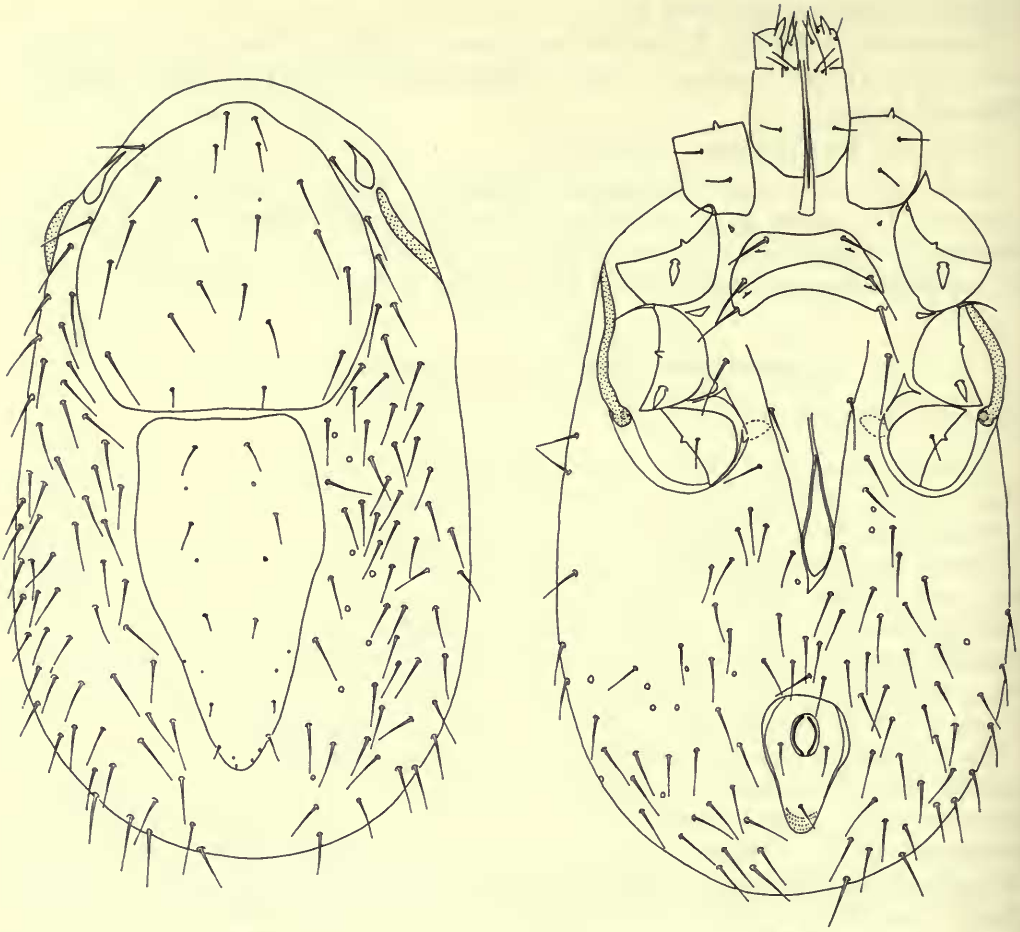
Podonotal shield 288–294μ long, 222–228μ wide between setae *z*3, bearing 10 pairs of setae. Setae *i*2 are absent ; lengths of setae *i*3 and *i*5 about two-thirds the lengths of *z*1 and *z*3 respectively. Opisthonotal shield 315–336μ long, 150–160μ wide at the level of setae *J*1, bearing 5 pairs of setae. Length of seta *J*2 about one-third the distance between *J*2 and *J*3. The terminal and subterminal setae are absent. The two pairs of postero-lateral setae are short and fine except in one specimen, which has a longer seta on one side only. Both shields have a reticulate pattern.

Sternal shield clearly demarcated from reticulate presternal area ; posterior portion heavily sclerotized. Length of shield 54μ, width between second pair of setae 111–120μ. Sternal seta I about five-sixths as long as seta II. Genital shield terminates in an extremely fine point and its posterior surface bears two strongly sclerotized linear markings which converge near the middle of the shield. Length of shield, from level of genital setae, is 192μ ; width between bases of setae is 66μ ; length of genital setae nearly equal to the distance between their bases. Anal shield pear-shaped, 102–108μ long to base of postanal seta, 76–84μ wide through middle of anus. Paranal setae near posterior margin of anus, slightly longer than the postanal seta.

Integument of idiosoma bears numerous dorsal and ventral setae, the longest of the postero-dorsal setae measuring about 48μ. Peritreme extends to anterior fourth of coxa II ; peritrematal shield interrupted, the anterior part extending to the middle of coxa I. Endopodal shields are present between coxae III and IV, and very small ones between coxae I and II, and between coxae II and III. Metapodal shields are not clearly visible.

The chaetotaxy of the legs differs from the typical *Steatonyssus* pattern in that tibia I lacks seta pd_3. The posterior setae on coxae II and III are stout and spine-like. The segments of the first pair of legs are not suitable for measurement ; length of tibia IV is 84μ and of tarsus IV is 192μ ; basal width of tarsus IV is 40μ.

MALE AND PROTONYMPH. Unknown.



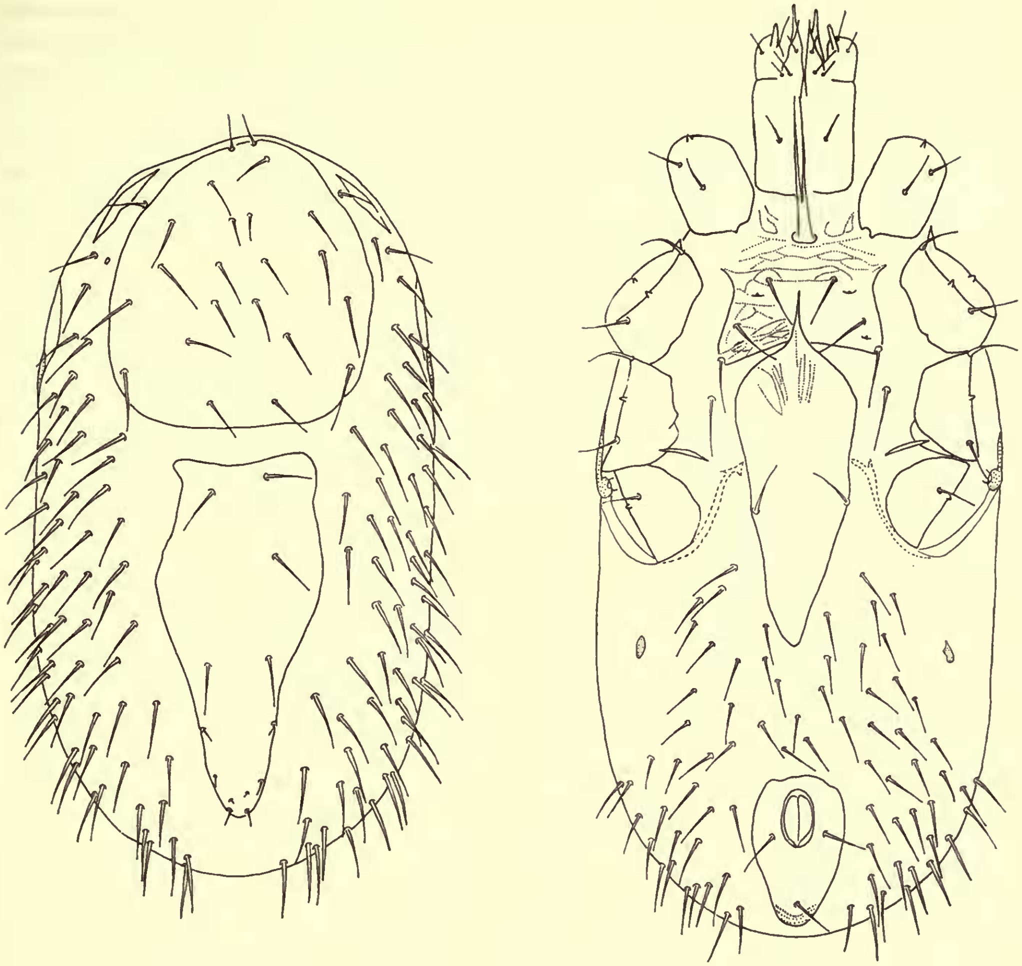
FIGS. 72–73. *Steatonyssus* (*Steatonyssus*) *sudanensis* (Hirst). Dorsum (fig. 72) and venter (fig. 73) of female.

HOST AND LOCALITY. *Taphozous nudiventris* (Cretzschmar) from Khartoum, Sudan, 9th December, 1925 [female paratypes in the collection of the British Museum (Natural History)].

Steatonyssus (Steatonyssus) tibialis sp. nov.

FEMALE (Text-figs. 74–75). Deutosternum has 8 teeth. Basal segment of chelicera 30μ, second segment 114μ, chelae about 40μ long.

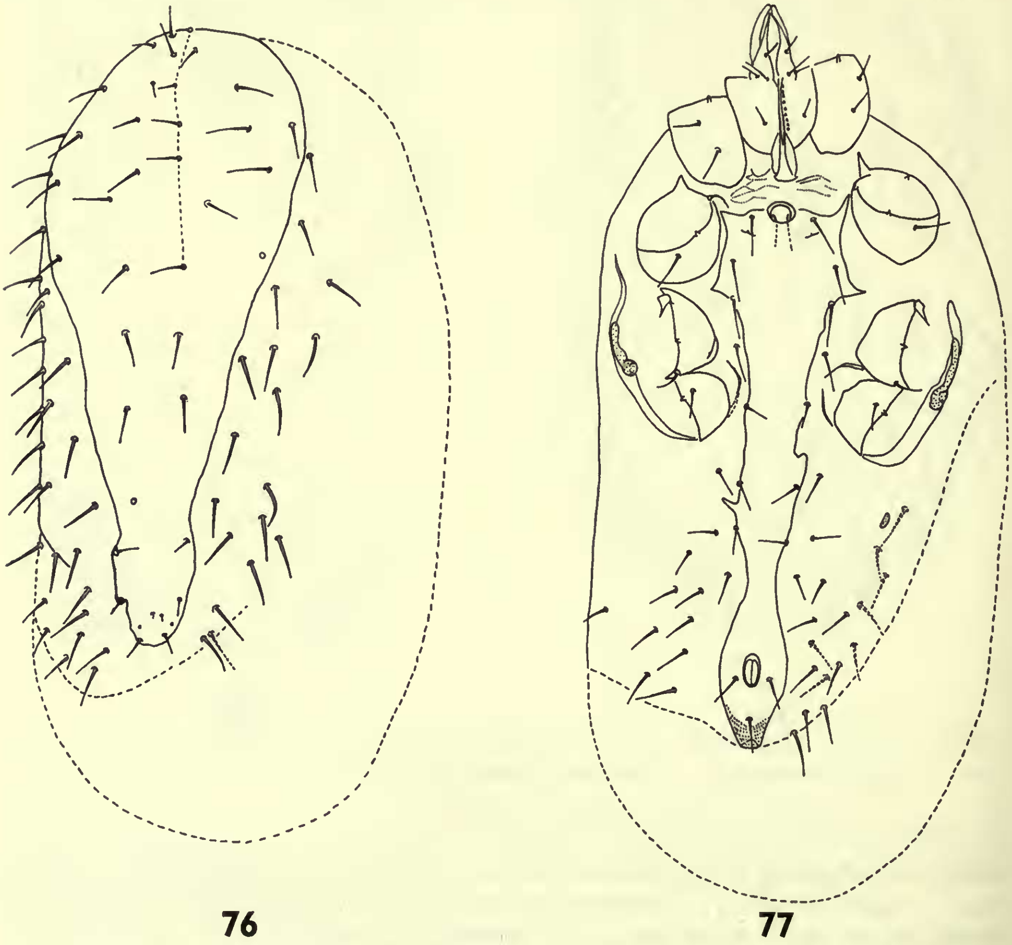
Podonotal shield $258–276\mu$ long, $204–222\mu$ wide between setae *z*3, bearing eleven pairs of setae. Length of seta *i*2 slightly more than half that of *i*3 ; setae *i*3 and *i*5 approximately two-thirds as long as setae *z*1 and *z*3 respectively. Opisthonotal



FIGS. 74–75. *Steatonyssus* (*Steatonyssus*) *tibialis* sp. nov. Dorsum (fig. 74) and venter (fig. 75) of female.

shield 318–348μ long, 132–156μ wide at level of setae *J*1, bearing usually 7 pairs of setae. Length of seta *J*2 about half the distance between *J*2 and *J*3. Seta *J*2 is missing on one side in the holotype, *J*1 is missing on one side in one of the paratypes; a third paratype has an additional unpaired seta at the level of *J*3. The terminal and postero-lateral setae on the shield are subequal in length and do not exceed one-third the length of seta *J*2. Both shields are weakly reticulate.

Anterior margin of sternal shield not demarcated from reticulate presternal area; posterior border a little more heavily sclerotized than rest of shield, with a slight granulation and with a more compressed reticulate pattern. Length of shield from level of first pair of setae is 54–60μ, width between second pair of setae is 114–120μ. Sternal and metasternal setae subequal in length. Genital shield 126–150μ long from level of genital setae, 84μ wide between the setae ; length of genital setae about half the distance between their bases. The shield has a sharply pointed antero-median process which extends over the sternal shield. The anal shield, which has an irregular anterior margin, is 108–120μ long to the base of the postanal seta, 84–90μ wide through the middle of the anus. The paranal setae are on a level between the middle and posterior margin of the anus.



Figs. 76–77. *Steatonyssus* (*Steatonyssus*) *tibialis* sp. nov. Dorsum (fig. 76) and venter (fig. 77) of male.

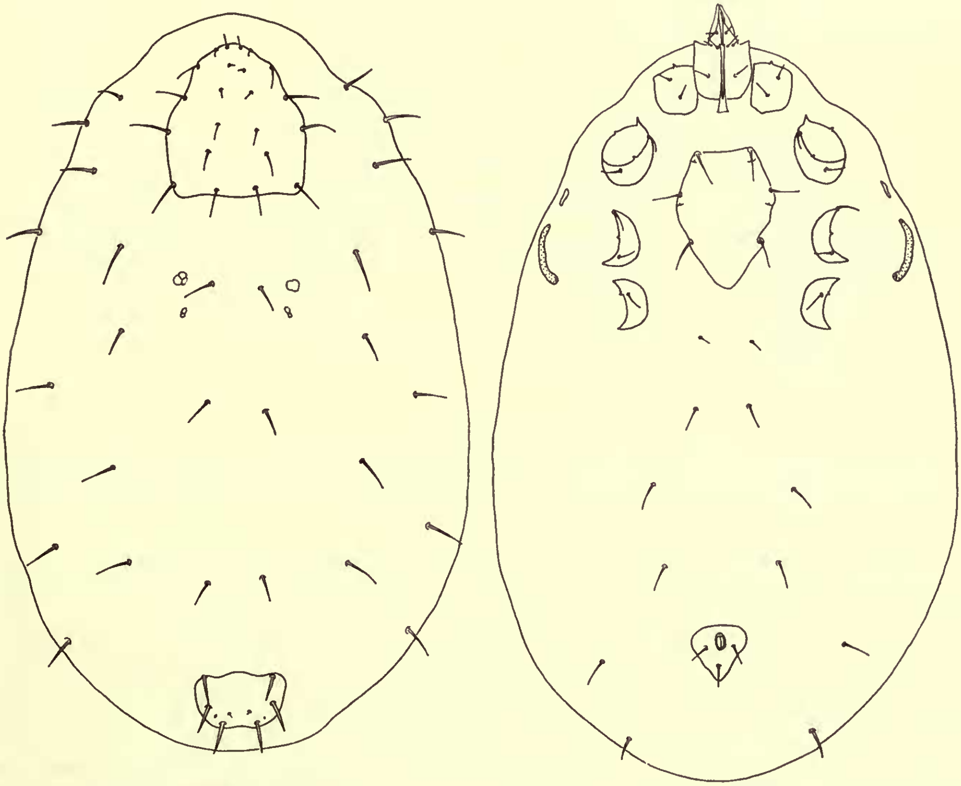
Integument of idiosoma bears 96–97 pairs of setae. The ventral setae are slender and about the same length as the genitals ; the dorsal setae are slightly longer and stouter, those near the posterior margin having a maximum length of 48μ.

Peritremes terminate at a point level approximately with the middle of coxa III ; peritrematal shield interrupted at posterior margin of coxa II, the separated leaf-like portion lying over the anterior part of coxa II and the posterior margin of coxa I. A pair of slender endopodal shields is situated between coxae III and IV, and a pair of very weakly sclerotized, roughly oval, metapodal shields behind coxae IV.

The chaetotaxy of the legs differs from the typical *Steatonyssus* pattern in that tibiae III and IV each have an additional dorsal seta, ad_2. Length of tibia I, 102μ ; tarsus I, 228μ ; tibia IV, 117μ ; tarsus IV, 234μ ; basal width of tarsus IV, 40μ.

MALE (Text-figs. 76–77). Only one damaged specimen is available in which the chelae are retracted ; the deutosternum has 8 teeth. Dorsal shield 510μ long, 168μ wide between setae *z*3. Chaetotaxy similar to that of the female except that seta *J*3 is missing on one side.

Holoventral shield very narrow with irregular lateral margins. It bears 3 pairs of setae in the sternal region, one pair of genitals, and 2 pairs of setae in the preanal



FIGS. 78–79. *Steatonyssus* (*Steatonyssus*) *tibialis* sp. nov. Dorsum (fig. 78) and venter (fig. 79) of protonymph.

region. The metasternals are situated on the striated integument beside the shield. Peritremes short, as in the female.

Chaetotaxy of legs as in the female. Anterior seta on coxa III has a broad, almost rectangular, basal portion, extended into a lateral point. Length of tibia I 75µ ; tarsus I, 150µ ; tibia IV, 78µ ; tarsus IV, 153µ.

PROTONYMPH (Text-figs. 78–79). Podonotal shield 190µ long, 150µ wide between setae *z*3, bearing eleven pairs of setae. Pygidial shield 75µ long, 105µ wide, with 3 pairs of relatively long, stout setae and one pair of minute subterminal setae. Anal shield 48µ long to base of postanal seta, 66µ wide through middle of anus. Chaetotaxy of legs normal. Length of tibia I, 51µ ; tarsus I, 111µ ; tibia IV, 51µ ; tarsus IV, 117µ.

HOST AND LOCALITY. *Nycteris thebaica capensis* Smith, Kanye, Bechuanaland Protectorate, collected by Dr. F. Zumpt, 9th December, 1957. Holotype, 3 ♀ paratypes, 2 protonymphs in the collection of the South African Institute for Medical Research, Johannesburg ; allotype ♂ (1963.11.11.45), 4 ♀ paratypes (1963.11.11.46–49) and 3 protonymphs (1963.11.11.50–52) in the collection of the British Museum (Natural History).

Subgenus ***STEATONYSSELLA*** nov.

Type : *Steatonyssus furmani* Tipton & Boese, 1958

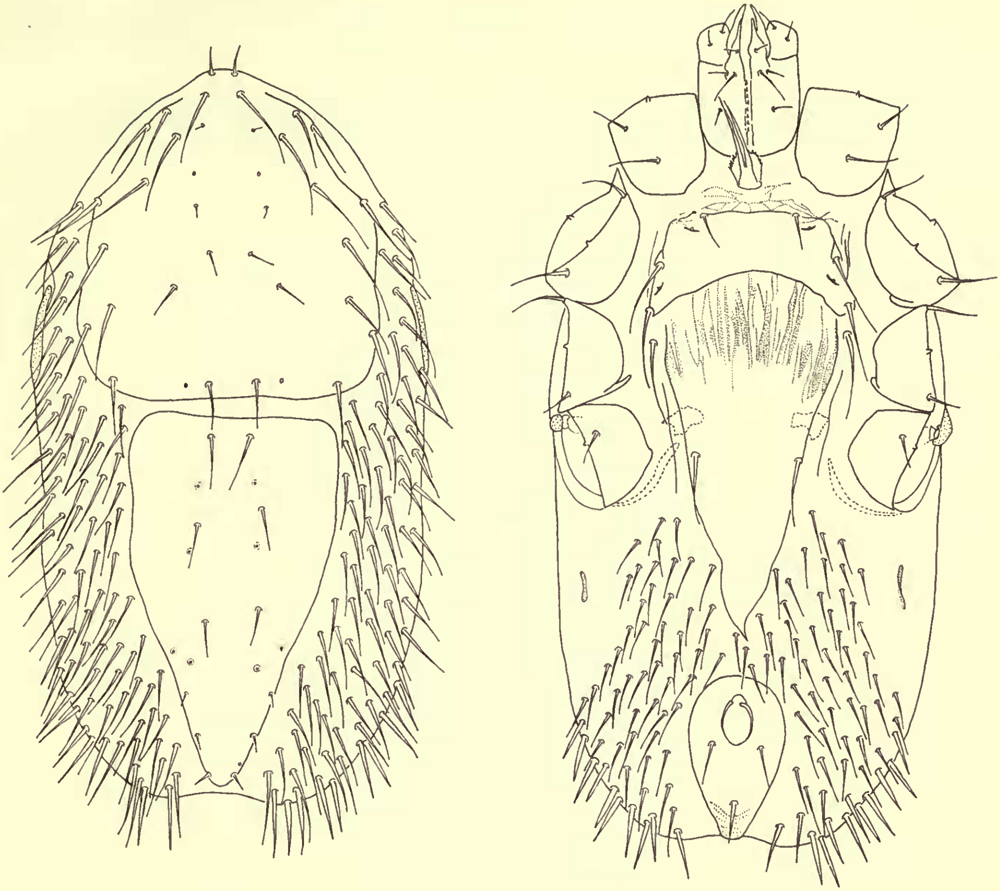
Steatonyssus (Steatonyssella) furmani Tipton & Boese

Steatonyssus furmani Tipton & Boese 1958, Proc. ent. Soc. Wash. **60** : 80, figs. 1–4 ; Radovsky & Furman 1963, Ann. ent. Soc. Amer. **56** : 274.

FEMALE (Text-figs. 80–81). Deutosternal teeth not clearly visible. First cheliceral segment 21µ, second segment 66µ, chela 34µ long. Palp without a trochantal process.

Podonotal shield 249–252µ long, 170–180µ wide between setae *z*3, bearing 16 pairs of setae. Setae *i*2 minute, about two-thirds the length of *i*3 and not more than one-sixth the distance between *i*4 and *z*2. Seta *i*3 about one-seventh the length of *z*1 ; seta *i*5 approximately two-thirds as long as *z*3. Opisthonotal shield 282–288µ long, 150µ wide at level of setae *J*1 ; it bears 6 pairs of setae, the subterminals being absent. Length of setae *J*2 less than half the distance between *J*2 and *J*3 ; the three posterior pairs of setae are very short, the terminals (12µ) not more than twice as long as the longest postero-laterals. The three pairs of submedian and one pair of postero-lateral pores have thickened rims. The anterior shield is reticulate, but the ornamentation of the posterior shield is not distinct in the specimens examined.

Sternal shield 45–48µ long, 135–145µ wide between the second pair of setae ; it is weakly sclerotized, without ornamentation, and is clearly demarcated anteriorly from the reticulate presternal area. Sternal seta I not quite half the length of setae II ; setae II–IV subequal in length. Genital shield 126–138µ long from level of genital setae, terminating in a sharp point ; 70–78µ wide between the setae ;



80 **81**

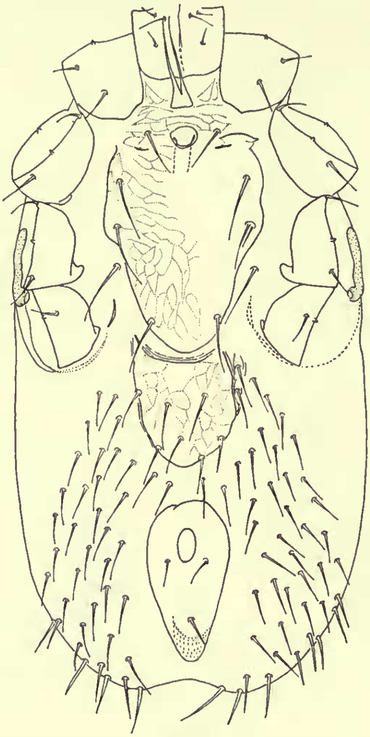
FIGS. 80–81. *Steatonyssus* (*Steatonyssella*) *furmani* Tipton & Boese. Dorsum (fig. 80) and venter (fig. 81) of female.

length of genital setae about two-thirds the distance between their bases. Anal shield 96–108µ long to base of postanal seta, 69–72µ wide through middle of anus ; paranal setae level with posterior margin of anus.

Integument of idiosoma bears numerous setae. Ventral setae three-quarters as long as the genitals, becoming stout and spine-like near the posterior margin. Dorsal setae about as long as the genitals, stouter near the margin of the body ; postero-dorsal setae have a maximum length of 54µ. Peritremes extend almost to anterior margin of coxa III ; peritrematal shield interrupted at level of posterior margin of coxa II, the separated leaf-like portion extending from anterior fourth of coxa II to posterior margin of coxa I. Endopodal shields cannot be distinguished ; weakly sclerotized, elongate metapodal shields are present behind coxae IV.

Chaetotaxy of the legs follows the typical *Steatonyssus* pattern. Length of tibia I, 60μ ; tarsus I, 105μ ; tibia IV, 66μ ; tarsus IV, 140μ ; basal width of tarsus IV, 42μ.

MALE (Text-fig. 82). Deutosternal teeth not clearly visible. First cheliceral segment 21μ, second segment 57μ, chela and spermadactyl 42μ long.



82

FIG. 82. *Steatonyssus* (*Steatonyssella*) *furmani* Tipton & Boese. Venter of male.

Form and chaetotaxy of dorsal shields as in the female. Podonotal shield 198μ long, 156μ wide between setae *z*3. Opisthonotal shield 235μ long, 110μ wide at level of setae *J*1. The venter bears three separate shields. Sternito-genital shield reticulate, not clearly demarcated from the presternal area, bearing 3 pairs of sternal setae and one pair of genitals ; metasternal setae situated on the striated integment beside the shield. Ventral shield also reticulate, concave anteriorly, bearing 7 setae. Anal shield similar to that of female, 87μ long to base of postanal seta, 60μ wide through middle of anus.

Setae on integument of idiosoma similar in form to those of the female, but less numerous. Peritremes as in female ; metapodal shields not clearly distinguishable.

Chaetotaxy of legs as in female. Length of tibia I, 45μ ; tarsus I, 75μ ; tibia IV, 48μ ; tarsus IV is bent and cannot be measured.

PROTONYMPH. Described by Radovsky & Furman (p. 274).

HOST AND LOCALITIES. *Lasiurus borealis* (Müller), Yolo Co., California, U.S.A., collected by D. Constantine, 10th–12th August, 1954 (1 ♂, 2 ♀♀ lent by Dr. F. Radovsky). Recorded from the same host in Indiana (Tipton & Boese, 1958) and in Illinois and New York (Radovsky & Furman, 1963).

Species Incertae Sedis

We have been unable to examine the type material of the following seven species which have been referred to the genus *Steatonyssus*.

1. *Steatonyssus abramus* Wang Dwen-Ching, 1963.
   Acta Ent. Sinica **12** (1) : 57, figs. 7–8.
2. *Dermanyssus avium* Wagner, 1841.
   Icon. Zool. t. 25, f.11.
3. *Steatonyssus hubli* Hiregaudar & Bal, 1956.
   Current Sci. **24** : 221 (1955), (*nom. nud.*).
   Agra Univ. J. Res. (*Sci.*) **5** : 107, figs.
4. *Steatonyssus longispinosus* Wang Dwen-Ching, 1963.
   Acta Ent. Sinica **12** (1) : 58, figs. 9–10.
5. *Dermanyssus murinus* Lucas, 1840.
   Hist. nat. Crust. Arachn. Myr. : 479.
6. *Steatonyssus superans* Zemskaya, 1951.[1]
   Avtoref. Dissert. Mosk. Gos. Univ., Moskva : 1–11 ;
   Bregetova, 1956. *Akad. Sci. U.S.S.R.* **61** : 162.
7. *Dermanyssus vespertilionis* Dugès, 1834.
   Ann. Sci. nat. (2), **1** : 18.

HOST-PARASITE LIST

CHIROPTERA

Antrozous pallidus pacificus Merriam
Steatonyssus (*Steatonyssus*) *antrozoi* Radovsky & Furman

Coleura afra (Peters)
Steatonyssus (*Steatonyssus*) *calcaratus* Radovsky & Yunker

Corynorhinus spec.
Steatonyssus (*Steatonyssus*) *occidentalis* (Ewing)

Cynopterus sphinx (Vahl)
Steatonyssus (*Steatonyssus*) *evansi* Delfinado
Steatonyssus (*Steatonyssus*) *faini* Delfinado

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[1] Since completing this paper we have received specimens of *Steatonyssus superans* Zemskaya, by courtesy of Dr. N. G. Bregetova. In our key, this species comes out with *Steatonyssus* (*S.*) *occidentalis* (Ewing), from which it can be distinguished as follows : The peritreme is longer, extending approximately to the middle of coxa II. At the posterior end of the body there are about eight pairs of thick, stiff, rod-like setae which taper abruptly at the tips.

Dasypterus intermedius (H. Allen)
Steatonyssus (*Steatonyssus*) *radovskyi* sp. nov.

Eidolon helvum (Kerr)
Steatonyssus (*Steatonyssus*) *javensis brevisetosus* ssp. nov.

Eptesicus fuscus fuscus (Palisot de Beauvois)
Steatonyssus (*Steatonyssus*) *antrozoi* Radovsky & Furman
Steatonyssus (*Steatonyssus*) *occidentalis* (Ewing)

Eptesicus fuscus pallidus Young
Steatonyssus (*Steatonyssus*) *occidentalis* (Ewing)

Eptesicus serotinus (Schreber)
Steatonyssus (*Steatonyssus*) *periblepharus* Kolenati

Eptesicus tenuipinnis (Peters)
Steatonyssus (*Steatonyssus*) *javensis brevisetosus* ssp. nov.

Glossophaga soricina (Pallas)
Steatonyssus (*Steatonyssus*) *joaquimi* (Fonseca)

Hipposideros cyclops (Temminck)
Steatonyssus (*Steatonyssus*) *hipposideros* Till

Lasiurus borealis (Müller)
Steatonyssus (*Steatonyssus*) *occidentalis* (Ewing)
Steatonyssus (*Steatonyssella*) *furmani* Tipton & Boese

Miniopterus schreibersi natalensis (Smith)
Steatonyssus (*Steatonyssus*) *natalensis* Zumpt & Patterson

Myotis spec.
Steatonyssus (*Steatonyssus*) *emarginatus* Radovsky & Furman

Myotis albescens (Geoffroy)
Steatonyssus (*Steatonyssus*) *joaquimi* (Fonseca)

Myotis bocagei (Peters)
Steatonyssus (*Steatonyssus*) *javensis brevisetosus* ssp. nov.

Myotis capaccinii (Bonaparte)
Steatonyssus (*Steatonyssus*) *periblepharus* Kolenati

Myotis emarginatus (Geoffroy)
Steatonyssus (*Steatonyssus*) *periblepharus* Kolenati

Myotis lucifugus (Le Conte)
Steatonyssus (*Steatonyssus*) *occidentalis* (Ewing)

Myotis mystacinus (Kuhl)
Steatonyssus (*Steatonyssus*) *periblepharus* Kolenati

Myotis velifer (J. A. Allen)
Steatonyssus (*Steatonyssus*) *occidentalis* (Ewing)

Myotis yumanensis (H. Allen)
Steatonyssus (*Steatonyssus*) *emarginatus* Radovsky & Furman

Nycteris spec.
Steatonyssus (*Steatonyssus*) *brucei* Lavoipierre

Nycteris macrotis Dobson
Steatonyssus (*Steatonyssus*) *afer* Radovsky & Yunker

Nycteris thebaica capensis Smith
Steatonyssus (*Steatonyssus*) *tibialis* sp. nov.

Nycteris thebaica thebaica Geoffroy
Steatonyssus (*Steatonyssus*) *longipes* Radovsky & Yunker

Nycticeius humeralis (Rafinesque)
Steatonyssus (*Steatonyssus*) *ceratognathus* (Ewing)

Pipistrellus abramus (Temminck)
Steatonyssus (*Steatonyssus*) *abramus* Wang Dwen-Ching
Steatonyssus (*Steatonyssus*) *longispinosus* Wang Dwen-Ching

Pipistrellus babu Thomas
Steatonyssus (*Steatonyssus*) *javensis javensis* Oudemans

Pipistrellus ceylonicus (Kelaart)
Steatonyssus (*Steatonyssus*) *hubli* Hiregaudar & Bal

Pipistrellus hesperus (H. Allen)
Steatonyssus (*Steatonyssus*) *emarginatus* Radovsky & Furman

Pipistrellus kuhli (Kuhl)
Steatonyssus (*Steatonyssus*) *periblepharus* Kolenati

Pipistrellus nanus (Peters)
Steatonyssus (*Steatonyssus*) *afer* Radovsky & Yunker
Steatonyssus (*Steatonyssus*) *brucei* Lavoipierre
Steatonyssus (*Steatonyssus*) *eos* Zumpt & Till

Pipistrellus pipistrellus (Schreber)
Steatonyssus (*Steatonyssus*) *periblepharus* Kolenati

Rhinolophus foxi Thomas
Steatonyssus (*Steatonyssus*) *aelleni* Radovsky & Yunker

Rhinolophus landeri lobatus Peters
Steatonyssus (*Steatonyssus*) *benoiti* sp. nov.

Scotophilus kuhli Leach*
Steatonyssus (*Steatonyssus*) *evansi* Delfinado
Steatonyssus (*Steatonyssus*) *faini* Delfinado

Scotophilus murinoflavus (Heuglin)
[*? = Scotophilus leucogaster* (Cretzschmar)]
Steatonyssus (*Steatonyssus*) *nyassae* (Hirst)

Scotophilus nigrita (Schreber)
Steatonyssus (*Steatonyssus*) *brucei* Lavoipierre

Scotophilus temminckii (Horsfield)
Steatonyssus (*Steatonyssus*) *evansi* Delfinado
Steatonyssus (*Steatonyssus*) *faini* Delfinado

Tadarida brasiliensis (Geoffroy-Saint-Hilaire)
Steatonyssus (*Steatonyssus*) *occidentalis* (Ewing)

Tadarida spillmanni Monard
Steatonyssus (*Steatonyssus*) *crassisetosus* sp. nov.

Taphozous nudiventris (Cretzschmar)
Steatonyssus (*Steatonyssus*) *sudanensis* (Hirst)

Triaenops afer Peters
Steatonyssus (*Steatonyssus*) *calcaratus* Radovsky & Yunker

Vespertilio superans Thomas
Steatonyssus (*Steatonyssus*) *spinosus* (Willmann)
Steatonyssus (*Steatonyssus*) *superans* Zemskaya

Unidentified Bats
Steatonyssus (*Steatonyssus*) *afer* Radovsky & Yunker
Steatonyssus (*Steatonyssus*) *ceratognathus* (Ewing)
Steatonyssus (*Steatonyssus*) *evansi* Delfinado
Steatonyssus (*Steatonyssus*) *faini* Delfinado
Steatonyssus (*Steatonyssus*) *javensis javensis* (Oudemans)
Steatonyssus (*Steatonyssus*) *occidentalis* (Ewing)

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* Considered by J. R. Ellerman and T. C. S. Morrison-Scott (*Checklist of Palaearctic and Indian Mammals*. London. 1951) as not specifically identifiable. This record may refer either to *Scotophilus heathi* (Horsfield) or to *Scotophilus temminckii* (Horsfield).

INSECTIVORA

Solenodon paradoxus Brandt
Steatonyssus (*Steatonyssus*) *spinosus* Willman

" Elephant Shrew "
Steatonyssus (*Steatonyssus*) *nyassae* (Hirst)

SUMMARY

1. The external morphology and classification of the genus *Steatonyssus* (Laelaptidae : Macronyssinae) are reviewed. The genus is divided into two subgenera : *Steatonyssus* s. str. (type *Steatonyssus periblepharus* Kol.) and *Steatonyssella* subgen. nov. (type *Steatonyssus furmani* Tipton & Boese).

2. Twenty-six species and subspecies are recognized of which the following five are considered new to science :

S. (*Steatonyssus*) *benoiti* sp. nov.
S. (*Steatonyssus*) *crassisetosus* sp. nov.
S. (*Steatonyssus*) *javensis brevisetosus* ssp. nov.
S. (*Steatonyssus*) *radovskyi* sp. nov.
S. (*Steatonyssus*) *tibialis* sp. nov.

3. *Steatonyssus primus* Grokhovskaya & Nguen-Huan-Hoe and *Steatonyssus secundus* Grokhovskaya & Nguen-Huan-Hoe are considered to be synonymous with *Steatonyssus evansi* Delfinado and *Steatonyssus faini* Delfinado, respectively.

4. A key is given for the identification of females of the genus and a host-parasite list is included.

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